U.S. Army Corps of Engineers
Galveston District

U.S. Army Corps of Engineers
Galveston District
Final
General Conformity Determination

for

Proposed Port Freeport Channel Widening
Brazoria County, Texas

December 2007

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FINAL
GENERAL CONFORMITY DETERMINATION
PORT FREEPORT CHANNEL WIDENING PROJECT
BRAZORIA COUNTY, TEXAS

Prepared for:

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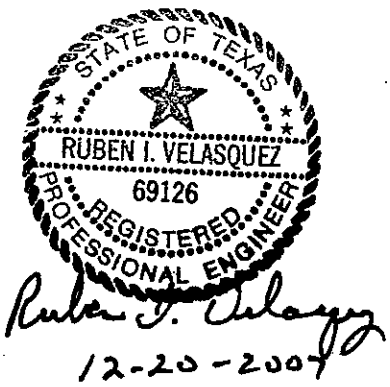
Professional Engineer Statement

The attached Final General Conformity Determination Document and estimate of air contaminant emissions is released on 20 December 2007 under the authority of Ruben I. Velasquez, P.E., Registration No. 69126, for the purpose of evaluation and discussion. This preliminary document is not to be used for construction or bidding purposes.



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Acronyms and Abbreviations

BRHND	Brazos River Harbor Navigation District
CAA	Federal Clean Air Act
CFR	Code of Federal Regulations
cy	cubic yards
DEIS	Draft Environmental Impact Statement
DOT	U.S. Department of Transportation
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
ft	feet/foot
HGB	Houston-Galveston-Brazoria
LOA	length over all
mmcy	million cubic yards
MPRSA	Marine Protection and Sanctuaries Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	nitrogen oxides
SIP	Texas State Implementation Plan
TCEQ	Texas Commission on Environmental Quality
tpd	tons per day
tpy	tons per year
TxLED	Texas Low-Emission Diesel
U.S.	United States
UPCA	upland confined placement area
USACE	U.S. Army Corps of Engineers
UTM	Universal Transmercator
VOC	volatile organic compound

1.0 INTRODUCTION

The Brazos River Harbor Navigation District (BRHND) of Brazoria County, Texas (also known as Port Freeport) applied to the U.S. Army Corps of Engineers (USACE), Galveston District, for a Clean Water Act Section 404 Permit and Rivers and Harbors Act Section 10 permit for dredge and fill activities related to the widening of portions of the Freeport Ship Channel on 14 April 2005. Activities subject to the jurisdiction of the USACE would include dredging in navigable waters to widen portions of the Freeport Harbor Jetty Channel and all of the Freeport Harbor Entrance Channel and placement of fill in waters of the United States (U.S.). Based on the Section 10/404 permit application submitted by Port Freeport, the USACE determined that the permitting action for the proposed dredge and fill activities constitutes a major Federal action. In accordance with the National Environmental Policy Act (NEPA), a Final Environmental Impact Statement (FEIS) has been prepared on behalf of the USACE (2007) for the Port Freeport Channel Widening Project to analyze and disclose the potential impacts of the proposed project and reasonable alternatives on the natural and human environment.

The proposed Port Freeport Channel Improvement Project will be located in Freeport, Brazoria County, Texas. Brazoria County is included in the Houston-Galveston-Brazoria (HGB) nonattainment area, which has been designated as being in "moderate" nonattainment for ozone. This area is in attainment with all other criteria pollutants. As such, the project is subject to the General Conformity Rule that applies to all nonattainment and maintenance areas. Based on an evaluation of air contaminant emissions from the construction activities associated with this project, it has been determined that a General Conformity Determination for nitrogen oxide (NO_x) emissions would be required. Emissions of volatile organic compound (VOC) for the construction activities are exempt from a General Conformity Determination because they are below the emissions threshold requiring such an analysis.

On 9 November 2006, the USACE, Galveston District, issued a Draft General Conformity Determination concurrently with the Draft EIS for the proposed Port Freeport Channel Widening Project. Copies of this determination were provided to various Federal and State agencies including the Texas Commission on Environmental Quality (TCEQ); the U.S. Environmental Protection Agency (EPA), Region VI; and the Brazoria County Health Department, the local air quality agency. On 20 and 27 November 2007, the USACE published the notice of availability of the draft determination in *The Sentinel*, a paper of general circulation for the Freeport and Brazoria County area. A copy of this publication and publisher's affidavit are in Appendix A of this document.

The USACE received comments from the TCEQ by letter dated 9 January 2007 and from the EPA by letter dated 10 January 2007. Copies of these letters are in Appendix B of this document. A summary of the agency comments and the USACE responses related to General Conformity is included in the body of this document. The TCEQ provided its concurrence with the Draft General Conformity Determination by letter dated 25 May 2007. A copy of this letter is provided in Appendix C.

This Final General Conformity Determination has been prepared pursuant to the Federal Clean Air Act (CAA), Section 176(c)(1), on behalf of the USACE. The purpose of this determination is to document that emissions that would result from the USACE action in approving the Port Freeport Channel Widening Project are in conformity with the Texas State Implementation Plan (SIP) for the HGB ozone nonattainment area. EPA's conformity guidance (EPA, 1993) recommends that when needed, a conformity determination is required for "only the one alternative that the Federal agency ultimately approves, permits or funds." Two widening alternatives, 600-foot (ft) and 500 ft, were identified for evaluation in the FEIS. The 600-ft alternative has been identified in the FEIS as the "preferred alternative." As shown in Appendices D and E of this document, air contaminant emissions from the 600-ft alternative were estimated to be greater than for the 500-ft alternative. As a worst-case alternative in terms of the estimate of air emissions, if the 600-ft alternative is shown to be conformant with the SIP, then the 500-ft alternative would too. Therefore, the following discussion focuses on the 600-ft alternative, the "preferred alternative," as described in the FEIS prepared on behalf of the USACE (2007) for the Port Freeport Channel Widening Project.

2.0 PROJECT BACKGROUND

The proposed Port Freeport Channel Widening Project site will be located in the Freeport Harbor Channel, Brazoria County, Texas. Specifically, the project site is located along the northern edge of the Freeport Harbor Jetty and Entrance Channels, between the towns of Surfside and Quintana. The project can be located on the U.S. Geological Survey quadrangle map entitled Freeport, Texas; approximate Universal Transmercator (UTM) coordinates: National American Datum of 1983, UTM Zone 14, Northing 861095.730029, and Easting 3206475.762543.

Port Freeport proposes to widen, but not deepen, portions of the Freeport Harbor Jetty Channel and all of the Freeport Harbor Entrance Channel. Beginning at Channel Station 63+46 (see Figure 1), which is just about even with the center of the U.S. Coast Guard (USCG) Station access channel, the Jetty Channel will be gradually widened, at the authorized depth, up to an additional 150 ft over the next 1,835 ft to Channel Station 45+00. Over the next 500 ft, to Channel Station 40+00, the widening will be less gradual and will go from the additional 150 ft to an additional 200 ft. From Channel Station 40+00, through the rest of the Jetty Channel and to the end of the Entrance Channel at Channel Station -300+00, the channel will be widened an additional 200 ft. The length of channel that is proposed for widening is 32,335 ft or 6.1 miles, of which 5.7 miles will be widened by 200 ft. The project depth will remain the same at 45 ft in the Jetty Channel and 47 ft in the Entrance Channel.

Widening the channel to 600 ft would generate approximately 3.2 million cubic yards (mmcy) of new dredged material. Approximately 2.9 mmcy of the new work material would consist of clay material and about 300,000 cubic yards (cy) would consist of silty/sand material. For comparison, widening the channel to 500 ft would generate approximately 1.6 mmcy of new dredged material consisting of approximately 1.4 mmcy of clay material and about 120,000 cy of silty/sand material. If approved by EPA under Section 103 of Marine Protection and Sanctuaries Act (MPRSA) and by USACE for placement under Section 102 of MPRSA, an Ocean Dredged Material Disposal Site previously designated as a one-time use site would be redesignated for placement of the 2.9 mmcy of clay/silt material. The 300,000 cy of silty/sand material would be used beneficially and placed on Quintana Beach in front of the Seaway Upland Confined Placement area (UPCA). The beach on either side of this location has been enhanced through General Land Office or other programs, but no material was placed in front of the Seaway UPCA. Placement of the material in this location would provide some protection from erosion for the Seaway UPCA.

Additional information regarding the proposed project is presented in the Section 2.0 of the EIS.

2.1 PURPOSE

The purpose of the proposed project is to widen the channel to eliminate existing operational constraints that include: (a) one-way traffic; (b) daylight-only operations for larger vessels; and (c) restrictions that do not allow the larger vessels to enter the Port when winds exceed 20 knots or crosscurrents exceed

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3,500 1,750 0 3,500
Feet

N
W E
S

Freeport
STAUFFER TURNING BASIN
BRAZOS HARBOR
UPPER TURNING BASIN
BRAZOSPORT TURNING BASIN
LOWER TURNING BASIN
JETTY CHANNEL
Quintana
Surfside Beach
ENTRANCE & JETTY CHANNELS
ENTRANCE CHANNEL
PA-1
PA-7
PA-3
PA-2 (Seaway)
PA-85
PA-86/87
PA-88
EPA ODMDS (Maintanence Site)
45-Ft Project New Work Site
GULF OF MEXICO

Figure 1
Freeport Harbor Ship Channel

Prepared for: USACE, Galveston District	
Job No.: 441591.00	Scale: 1:50,000
Prepared by: EMonshaugen	Date: 06/08/2006
File: N:/44159100/Projects/Final/Fig1.mxd	

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0.5 knots. The maximum ship dimensions permitted by the pilots at Freeport Harbor are: 825-ft length over all (LOA); 145-ft maximum beam; and 42-ft draft. These problems are discussed in more detail below.

LOA Restrictions – The length limitation of 825 ft is enforced because cross winds and currents force tankers to "crab" at an angle through the entrance channel. Ships of greater length than 825 ft are not able to clear the jetties under adverse wind and current conditions. Waivers on ship length are granted on a case-by-case basis for ships as large as 900-ft LOA and 160-ft beam to transit the Freeport Harbor Channel, provided that wind is less than 15 knots and there is no more than a 0.5 knot cross current at the mouth of the jetties. About three to four ships per month are granted these waivers. Numerous requests have been submitted for ships in the 920- to 950-ft LOA range to transit the channel and these requests have been denied. When denied access to Freeport Harbor, these ships normally divert to Corpus Christi or New Orleans.

Beam Restrictions – The maximum beam permitted under normal operations is 145 ft. Vessels with larger beams will require waivers to enter the channel.

One-Way Traffic Restriction – Because of the 400-ft width of the entrance and main channels, one-way ship traffic is always in effect in the Freeport Harbor Channel. This can result in delays when ship schedules coincide.

Daylight-Only Operation Restriction – Because of channel dimensions as well as the nature of the cargo of ships calling at Freeport Harbor, daylight-only operation is enforced on all vessels greater than 750 ft LOA or over 107 ft wide. This can result in waiting time of up to 12 hours, if ship arrival/departure occur at dark.

2.2 NEED

The project need is the elimination of operational constraints to allow vessels to avoid delays, thereby reducing shipping costs and logistical problems and increasing vessel safety.

As discussed in Section 1.3 of the EIS, the USACE conducted a study in which it noted the problems mentioned above; i.e., "that the relatively narrow (400-ft wide) entrance and main channels limit the Freeport Harbor Channel to one-way for all vessels and daylight-only operation for the larger vessels." They also note that "the light-loading, one-way traffic and daylight-only operation result in significantly higher costs to users of the Port Freeport than would be experienced if the harbor were enlarged and deepened. The transportation savings that would result from improvements at Freeport Harbor would be an economic benefit to the nation." Thus, the USACE has confirmed the potential need for the channel improvements to the Freeport Harbor Channel and that those improvements would serve the national interest. However, to reduce the time that is required for a Federal project to come to fruition and because of uncertainty in future Federal funding, Port Freeport has decided to undertake the widening project as a

permit action. This will allow the economic benefits that will result from a widened channel to accrue more quickly.

2.3 WIDENING ALTERNATIVES

For the proposed Port Freeport Channel Widening Project, two channel widening alternatives were considered; 500 and 600 ft. Alternatives greater than 600 ft were not considered because existing jetties were constructed to support up to a 600-ft channel and costs associated with relocating the jetties would make the project unfeasible. Additionally, current and projected shipping data suggest that widening the channel to more than 600 ft would provide very little benefit over a 600-ft channel (Martin Associates, 2007). Furthermore, the ongoing Federal study does not consider alternatives beyond 600 ft wide. Channel widths less than 500 ft were not considered as alternatives because a channel less than 500 ft wide would not lift the daylight only and one-way traffic restrictions.

2.4 DISPOSAL OF CLAY BALLS IN THE EXISTING SEAWAY PLACEMENT AREA

For the 600-ft alternative, Port Freeport is proposing to nourish the beach in front of the existing Seaway UPCA on Quintana Island. Three hundred thousand cubic yards of sandy material from the proposed dredging project will be placed at this location. During the beach nourishment process, it is likely that clay balls will be discharged from the dredge pipe onto the beach. The contractor will be responsible for collecting and disposing of clays balls that accumulate on the beach with diameters 2 inches or greater in the existing Seaway Placement Area. This activity will be completed using a front-end loader and 16 cy dump truck. The anticipated volume of the clay balls that will be disposed of in the Seaway Placement area is 200 cy.

2.5 BURIAL OF DREDGE PIPE AND DISPOSAL OF MATERIAL

A dredge pipe will need to be buried across the bottom of the channel during the beach nourishment phase of the project for the 600-ft alternative. The applicant has coordinated with the Brazos Pilots and USCG to identify the proper location and methodology for this action. The dredge pipe will be submerged across the full width (400 ft) of the existing Jetty Channel between Stations 20+00 and 50+00. The highest point of the pipe will not be higher than 49 ft below mean low tide.

A maximum of 10,000 cy will be excavated to construct a trench to bury the dredge pipe. There are two alternative methods for accomplishing this work: (1) the material may be excavated mechanically and carried offshore via a scow to be disposed of in Placement Area No. 1; and (2) the material may be hydraulically dredged and staged in the area to be widened. A hopper dredge will then pick up the material and transport it to Placement Area No. 1.

2.6 DISPOSAL OF ROCK AND OTHER DEBRIS

Port Freeport expects to encounter minimal quantities of rock and other debris during construction. Incidental rock with diameters less than 18 inches will be disposed of offshore in Placement Area No. 1. Rock and other debris with diameters greater than 18 inches will be become property of the contractor and will be disposed of in an existing, regulated municipal or county landfill. It is possible that at least one automotive frame will need to be removed from the channel. Automotive parts and other similar materials that may be recovered from the channel will either be disposed of by the contractor in an existing regulated municipal or county landfill, or in a legally operating scrap yard.

2.7 ADDITIONAL MAINTENANCE DREDGING

After the widening of the channel is completed, Port Freeport anticipates the need to perform maintenance dredging of the channel to remove any shoaling that has occurred during the construction period. Maintenance dredging is routinely conducted on the channel on a cyclical basis (normally 10-month cycle) with material taken to a properly permitted disposal site. However, it is anticipated that widening of the channel will result in an additional 984,000 cy per year of maintenance dredging material going to the disposal site with a corresponding increase in hours of operation of the maintenance dredging equipment.

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3.0 REGULATORY BACKGROUND – GENERAL CONFORMITY

General Conformity refers to the process of evaluating plans, programs, and projects to determine and demonstrate they meet the requirements of the CAA and the SIP. The General Conformity Rule requires conformity in coordination with and as part of the NEPA process. This project, as a Federal action, is subject to the General Conformity Rule promulgated by the EPA (1993). The rule mandates that the Federal government not engage in, support, or provide financial assistance for licensing or permitting, or approving any activity not conforming to an approved SIP. The SIP for the HGB nonattainment area is an EPA-approved plan for the regulation and enforcement of the National Ambient Air Quality Standards (NAAQS) in each air quality region within the state.

The General Conformity Rule is designed to ensure that Federal actions do not cause or contribute to degradation in air quality in an area that is designated as being in "nonattainment" area or a "maintenance" area with regard to meeting the NAAQS; thus, supporting the achievement of State and Federal air quality goals. The General Conformity Rule is codified at Title 40 Code of Federal Regulations (CFR) Part 51, Subpart W, "Determining Conformity of Federal Actions to State or Federal Implementation Plans."

The TCEQ has promulgated a corresponding rule under 30 TAC § 101.30, "Conformity of General Federal Actions to State Implementation Plans" (TCEQ, 1999). Unless specifically exempted, this rule applies to all Federal actions except programs and projects requiring funding or approval from the U.S. Department of Transportation (DOT), the Federal Highway Administration (FHWA), the Federal Transit Administration, or the Metropolitan Planning Organization. These types of programs and projects must instead comply with the conformity provisions implemented in the Transportation Conformity Rule issued by the DOT on 24 November 1993.

The CAA defines conformity to the SIP as the upholding of "an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards." Conforming activities or actions should not, through additional air pollutant emissions, result in the following:

- Cause or contribute to new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or interim emission reductions or other milestones in any area.

The purpose of this General Conformity requirement is to assure Federal agencies consult with State and local air quality districts to assure these regulatory entities know about the expected impacts of a Federal action and would include expected emissions in their SIP emissions budget.

Consistent with Section 176(c)(1) of the CAA, a Federal action is generally defined as any activity engaged in or supported in any way by any department, agency, or instrumentality of the Federal government (40 CFR 51.852). Federal actions include providing Federal financial assistance or issuing a Federal license, permit, or approval. Where the Federal Action is a permit, license, or other approval for some aspect of a non-Federal undertaking, the relevant activity is the part, portion, or phase of the non-Federal undertaking that requires the Federal Permit, license, or approval.

Pursuant to the General Conformity Rule, a Federal agency; e.g., the USACE, must make a General Conformity Determination for all Federal actions in nonattainment or maintenance areas where the total of direct and indirect emissions of a nonattainment pollutant or its precursors exceeds levels established by the Rule. For the HGB nonattainment area, the threshold level is 100 tons per year (tpy) for either NO_x or VOC. In addition, even if the total of direct and indirect emissions of VOC or NO_x do not exceed the 100 tpy threshold levels, when the total of direct and indirect emissions of any pollutant from the Federal action represents 10% or more of a nonattainment or maintenance area's total emissions of those pollutants, then the action is defined as a regionally significant action and a conformity determination would still be applicable.

The General Conformity Rule requires the inclusion of direct and indirect impacts of the Federal action in the conformity applicability analysis if those impacts are reasonably foreseeable and subject to continuing agency responsibility. Only those air emissions of NO_x and VOC related to the Federal action; i.e., those considered to be jurisdictional by the USACE, should be considered in this General Conformity Determination.

4.0 APPLICABILITY

The General Conformity Rule is applicable only to nonattainment and maintenance areas. The Port Freeport Channel Widening Project will be located in Brazoria County, Texas. Brazoria County is included in the eight-county HGB ozone nonattainment area, which is classified as "moderate" in terms of its degree of compliance with the current 8-hour NAAQS for ozone, but is in attainment with all other criteria pollutants. As such, the project is subject to the General Conformity Rule, which applies to all nonattainment and maintenance areas. This nonattainment classification affects facilities that will generate the air emissions of the ozone precursors, NO_x, and VOC, and will be located in the HGB nonattainment area.

Based on an evaluation of the air contaminant emissions from the construction activities associated with this project, it has been determined that a General Conformity Determination for NO_x emissions would be required. Emissions of VOC for the construction activities are exempt from a General Conformity Determination because they are below the emissions threshold requiring such an analysis.

The General Conformity rules specifically exclude from applicability maintenance dredging and debris disposal where no new depths are required, applicable permits are secured, and disposal will be at an approved disposal site. Therefore, a General Conformity Determination for this project would not include emissions from the additional maintenance dredging activities or debris disposal.

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5.0 AIR EMISSIONS INVENTORY

For purposes of this Final General Conformity Determination, an air emissions inventory was prepared for project-related activities based on the schedule and other assumptions as provided by the project sponsors. Air emissions estimates were calculated using techniques appropriate for a specific emissions generating activity or source. The basis, emission factors, and summary of emissions are provided in Appendix D of this document for the 600-ft alternative and Appendix E for the 500-ft alternative. As previously discussed, the following sections focus on the estimate of emissions for the 600-ft alternative as they are estimated to be greater than for the 500-ft alternative.

5.1 PROJECT EMISSIONS

The emission sources for the proposed Port Freeport Channel Widening Project will consist of marine and land-based mobile sources that will be utilized as scheduled for the 1-year duration of the project. The marine emission sources will include three types of dredges: clamshell, hydraulic, and hopper, as well as support equipment such as tugboats, tenders, runabouts, and shrimp boats. The marine emission sources and off-road equipment will consist primarily of diesel-powered engines. The land-based emission sources will include off-road equipment consisting of the bulldozers utilized for dredged material placement sites and on-road vehicles for employees commuting to and from the work site. The on-road employee vehicles will consist primarily of gasoline powered vehicles.

Project emissions were estimated for the expected projected duration, starting during the second quarter of 2008 through to the end of 2008. These emissions were based on projected equipment use and scheduling provided by the project sponsors. Engine load factors and emission factors were determined using EPA guidelines (EPA, 2000, 2004). Emissions of NO_x and VOC were estimated in tons per year for each piece of equipment. The estimated emissions were then totaled by category. The project emissions inventory included the following air emissions sources:

- Nonroad Mobile Equipment including:
  - Dredging Activities – dredges and support marine vessels
  - Land-side Dredged Material Placement – bulldozing equipment; and
- On-Road Mobile Sources – employee commuter vehicles

5.1.1 Dredging Activities

Air contaminant emissions directly related to the dredging equipment, including the main propulsion engine, generators used to drive the dredge pumps, and emissions from support equipment such as tugs and runabouts. Emissions for these types of equipment were calculated on an annual basis based on the anticipated type of activity, engine use, horsepower, load factor, and anticipated hours of operation during the construction period. It was assumed that the widening project would occur in three phases:

- Phase 1 – A 24-inch hydraulic cutter dredge would be used for pumping and on-shore placement of 300,000 cy of silt and sandy material;
- Phase 2 – A bucket crane dredge would be used to mechanically dredge 150,000 cy of clay material onto a barge for future on-shore placement; and
- Phase 3 – A hopper dredge would be used to dredge 2,750,000 cy of clay material for placement at Dredged Material Placement areas.
- Pipeline Trench – A maximum of 10,000 cy will be excavated to construct a trench to bury the dredge pipe. There are two alternative methods for accomplishing this work: (1) the material may be excavated mechanically and carried offshore via a scow to be disposed of in Placement Area No. 1; and (2) the material may be hydraulically dredged and staged in the area to be widened. A hopper dredge will then pick up the material and transport it to Placement Area No. 1.

When not dredging, air contaminant emissions were also estimated from dredging vessels when sailing as ocean going vessels; e.g., during periods of mobilization to the dredging site or during transport and placement of the dredged material.

Estimated emissions from dredging equipment and from the use of tug boats and miscellaneous marine vessels in support of the dredging activities were based on the emission factor algorithms from EPA's technical report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data," EPA 420-R-00-002, February 2000. This technical report is a compilation of engine and fuel usage test data from various types of marine vessels including bulk carriers, container ships, dredges, tankers, and tugboats. As presented in this document, emission factors may be determined based on an emission factor algorithm that is applicable to all marine engine sizes since, according to the EPA's document, the emissions data showed no statistically significant difference across engine sizes.

5.1.2 Land-Side Dredged Material Placement – Bulldozing Equipment

It is anticipated that land-side dredged material placement activities would occur only in support of the Phase I activities and would include working and compacting of the dredged material on-shore within a localized area of placement using bulldozing equipment. In addition, non-road equipment will be used in the collection and disposal of clay balls discharged from the dredge pipe onto the beach. Air contaminant emissions from the combustion of diesel fuel in the bulldozing equipment were calculated on an annual basis based on the anticipated engine type, horsepower, load factor, anticipated hours of operation, and emission factors generated using the EPA's NONROAD 2005 model. This computer model may be used to calculate emissions for many nonroad equipment types, categorizing them by horsepower rating and fuel type available for specific years; for a specific geographic area, state or county. The NONROAD 2005 model was utilized to provide emission factors for the bulldozers that may be available for use in Brazoria County for the model year 2007.

It is expected that Texas Low-Emission Diesel (TxLED) will be available for use in nonroad equipment such as bulldozers during the proposed construction period pursuant to the TxLED requirements of the

SIP. However, for conservatism, a reduction in NO_x emissions was not assumed in the final summary of emissions for this equipment.

5.1.3 On-Road Mobile – Employee Commuter Vehicles

Mobile source emissions associated with the Port Freeport Channel Widening Project construction would be generated from employee commuter vehicles to and from the worksite. It was assumed that commuter vehicles would include a mix of cars and light-duty trucks burning primarily gasoline. Mobile source emission factors were estimated using the EPA's mobile-source emissions model, MOBILE6.2 based on vehicle information and other input options specific to Brazoria County as provided by the TCEQ's Air Quality Planning and Implementation Division.

MOBILE6.2 is an emission factor model that may be used to calculate emission factors, in grams per mile, for different vehicle types under various operating conditions. These emission factors were multiplied by the type and number of vehicles and the estimated number of miles traveled to and from the worksite to estimate the annual emissions resulting from employee vehicles.

5.2 SUMMARY OF NO_X AND VOC Emissions

As previously discussed, for the 600-ft alternative, a dredge pipe will need to be buried across the bottom of the channel during the beach nourishment phase of the project for the 600-ft alternative. A maximum of 10,000 cy will be excavated to construct a trench to bury the dredge pipe. There are two alternative methods for accomplishing this work: (1) the material may be excavated mechanically and carried offshore via a scow to be disposed of in Placement Area No. 1; and (2) the material may be hydraulically dredged and staged in the area to be widened. A hopper dredge will then pick up the material and transport it to Placement Area No. 1. A summary of total emissions of NO_x and VOC for Alternative 2 with either option is shown in Table 1. The basis and methodology for calculation of these emissions may be found in Appendix G of this document.

TABLE 1

TOTAL ESTIMATED ALTERNATIVE 2 PROJECT NOx and VOC EMISSIONS
PIPELINE TRENCHING OPTIONS 1 AND 2

Air Contaminant	Option 1 Estimated Project Emissions (tons)	Option 2 Estimated Project Emissions (tons)
NO_X	430.35	430.67
VOC	5.05	5.05

*Project construction is expected to be completed in 1 year.

The air quality analysis for Alternative 2 from here forward includes the emissions assuming the use of Trenching Option 2 as this will result in the higher project emissions of the two options.

For comparison with the thresholds defined in the General Conformity Rule, the estimated annual emissions of NO_x and VOC are summarized in Tables 2 and 3, respectively, for each of the anticipated construction activities. Emissions of carbon monoxide, sulfur dioxide, and particulate matter are not considered in the General Conformity evaluation as this area is unclassified or in attainment with the NAAQS for each of those pollutants.

TABLE 2

SUMMARY OF NO_x EMISSIONS FOR YEAR 2008
(tpy)

Activity	NO_x Emission Rate (tpy)
Dredging Activities – Dredging Vessel Equipment and Dredging Support Vessels	281.69
Dredging Vessel Propulsion in Transit During Mobilization or Placement of Dredged Material	148.39
Land-side Dredged Material Placement – Bulldozing Equipment	0.54
On-Road – Employee Commuter Vehicles	0.05
Totals	**430.67**

As shown in Table 2, the estimates of NO_x emissions for the project would exceed the conformity threshold; i.e., greater than 100 tpy for the year 2008. Therefore, a General Conformity Determination for NO_x emissions resulting from this project is required.

TABLE 3

SUMMARY OF VOC EMISSIONS
(tpy)

Activity	VOC Emission Rate (tpy)
Dredging Activities – Dredging Vessel Equipment and Dredging Support Vessels	3.60
Dredging Vessels in Transit During Mobilization or Placement of Dredged Material	1.35
Land-side Dredged Material Placement – Bulldozing Equipment	0.04
On-Road – Employee Commuter Vehicles	0.06
Totals	**5.05**

As shown in Table 3, the estimate of VOC emissions for the project would be exempt from a General Conformity Determination because they are below the 100 tpy threshold for applicability.

6.0 EPA AND TCEQ COMMENTS AND USACE RESPONSES

After the issuance of the Draft General Conformity Determination in 9 November 2006, the USACE received comments from the EPA by letter dated 10 January 2007. The TCEQ provided initial comments by letters dated 9 January 2007, and final comments by letter dated 25 May 2007. Copies of this correspondence, along with a response letter from Port Freeport are provided in Appendices B and C of this document. The following is a summary of the agency comments related to the Draft General Conformity Determination and the responses, if any.

6.1 EPA COMMENTS

The EPA's comments included the following:

- The EPA found the estimated emissions for the proposed project to be well illustrated and quantified.
- In consultation with the TCEQ, the EPA supports the position of the TCEQ that the estimated project emissions, together with all other emissions in the nonattainment area, would not exceed the emissions budget in the Houston SIP allocated to construction activities.
- The EPA recommended that Table 4 of Chapter 5 of the "Preliminary General Conformity Determination," be revised to include SIP emissions budget information for Brazoria County.

In response to the latter comment, Table 5 was revised to include a comparison to the SIP emissions budget information for Brazoria County as provided by the TCEQ. The revised Table 5 is included in Section 7.0 of this document.

6.2 TCEQ COMMENTS

In its initial response letter dated 9 January 2007, the TCEQ provided the following comments:

- The TCEQ requested that Table 4 of Chapter 5 of the "Preliminary General Conformity Determination," be revised to clarify the total project emissions.
- The TCEQ encouraged the USACE to consider the use of newer or retrofitted construction and marine equipment to reduce NO_x emissions related to the project.

In response to the latter comment, Table 5 was revised to clarify the total project emissions. The revised Table 5 is included in Section 7.0 of this document.

Port Freeport provided a response to the TCEQ's comments as discussed in Section 6.3.

6.3 PORT FREEPORT RESPONSE

By letter to the TCEQ dated 15 March 2007, Port Freeport indicated that it would agree to encourage the use of construction contractors that already participate in the Texas Emissions Reduction Plan (TERP)

grant program, and direct, through provisions included in its construction contracts, that construction contractors implement Best Management Practices relating to air quality. This would include recommending use of diesel fuels compliant with the TxLED program. A copy of the letter from Port Freeport is provided in Appendix B of this document.

6.4 TCEQ GENERAL CONFORMITY CONCURRENCE

Based on these commitments from Port Freeport and other project information, the TCEQ provided a General Conformity Concurrence for the project by letter dated 25 May 2007. In its final comments letter dated 25 May 2007, the TCEQ provided general conformity concurrence for the project. The TCEQ also suggested that the USACE adopt pollution prevention and/or reduction measures in conjunction with this and future projects. A listing of these measures is shown in the copy of this letter in Appendix C.

6.5 USACE SUBMITTAL OF SUPPLEMENTAL PROJECT INFORMATION

During the design process for this project, project details that were not addressed in the Draft Environmental Impact Statement (DEIS) were identified and are addressed in detail in the FEIS. These included:

- Collection and disposal of clay balls that will discharged from the dredge pipe onto the beach in the existing Seaway UCPA;
- Burial of dredge pipe and disposal of material during the beach nourishment phase of the project;
- Disposal of rock and other debris encountered during construction; and
- Additional dredging material resulting from the widening of the channel.

This information was described in detail by letter dated 11 October 2007 from the USACE to the TCEQ and other State and Federal agencies and interested tribes. Included with this letter was an estimate of the air contaminant emissions increase that would result from the activities. A copy of this letter is provided in Appendix B.

6.6 TCEQ REVISED GENERAL CONFORMITY CONCURRENCE

Based on supplemental project information provided by the USACE, the TCEQ provided a Revised General Conformity Concurrence for the project by letter dated 19 November 2007. In this letter the TCEQ stated it has determined that emissions from the proposed project additions will not exceed the emissions from the applicable SIP. As before, the TCEQ also suggested that the USACE adopt pollution prevention and/or reduction measures in conjunction with this and future projects. In addition, the TCEQ requested that the USACE utilize Trenching Option 1 (mechanical excavation) to complete the project. A listing of these measures is shown in the copy of this letter in Appendix C.

The USACE has acknowledged the request by the TCEQ for the project to utilize Trenching Option 1. However, because the difference in emissions between Trenching Options 1 and 2 is relatively minor (about 0.3 tons/year of NO_x) and because the applicant requested that both options remain available to allow flexibility in the bidding process, both options are presented in this General Conformity Determination and in the FEIS. In addition, because Option 2 presents a worst-case scenario, it is presented in emissions calculations and used as the basis for analysis for the 600-ft alternative in both documents.

6.7 USACE SUBMITTAL OF PROJECT UPDATE

By letter to the TCEQ dated 13 December 2007, the USACE provided the TCEQ with a project update and plan-forward. The Port Freeport Channel Widening Project initially contemplated construction activities to occur for a duration of 1 year starting in the 4th quarter of 2007 with completion in 2008. However, it became evident that the start of construction will not begin in 2007, and has been reprogrammed to begin in about April 2008. Based on information from the project sponsors, it is expected that the project may be completed in total during 2008 with no overlap to 2009. The corresponding breakout of NO_x emissions will also shift such that these emissions will all occur in 2008. However, there will be no change in the total emissions from the project beyond what we have already reported to the TCEQ; e.g., an incidental increase in NO_x emission from proposed pipeline trenching as described in Section 6.5.

Based on informal communication with the TCEQ, the shift in the construction schedule and corresponding shift in NO_x emissions may still be accommodated in the SIP because there would be no increase in emissions over those previously reported to the TCEQ and because construction would not overlap into 2009. The shift in schedule and the corresponding shift in air contaminant emissions to 2008 would require an update to the General Conformity documentation as well as to the Environmental Impact Statement for this project.

In updating the General Conformity documentation, the USACE proposed to move forward with a Final General Conformity Determination; the final document to include the latest construction schedule and shift in NO_x emissions to 2008. The Final General Conformity Determination document would be published and noticed as a final determination and copies will be provided to the TCEQ, EPA, and others, as before. A copy of this letter is provided in Appendix B.

7.0 FINAL GENERAL CONFORMITY DETERMINATION

Based on evaluation of the proposed project description, estimated air quality emissions, and consultation with the TCEQ and the EPA, the USACE has determined that its approval of the Port Freeport Channel Widening Project will meet the requirements of TCEQ Chapter 101, § 101.30(h)(1)(E)(i)(I). This section of the TCEQ's General Conformity Rule applies to a project in an ozone nonattainment area where the EPA has approved a revision to the area's attainment demonstration after 1990 and the TCEQ makes a determination that "the total of direct and indirect emissions from the action, or portion thereof, is determined and documented by the TCEQ to result in a level of emissions, which, together with all other emissions in the nonattainment area, would not exceed the emissions budgets specified in the SIP."

The emissions budget for General Conformity purposes is defined in the TCEQ General Air Quality Rules (30 TAC §101.30(8)). In summary, the emissions budget is that portion of the total allowable emissions used as a basis for the latest approved revision of the SIP that is allocated to mobile sources; any stationary source or class of stationary sources; to any Federal action or class of actions; to any class of area sources; or to any subcategory of the emissions inventory.

According to a letter from the EPA to the Federal Energy Regulatory Commission dated 24 August 2005, any General Conformity Determination must be based on the new 8-hour ozone standard and the corresponding attainment dates and de minimis levels. For the HGB nonattainment area, the most recently approved SIP revision is the 2004 Mid-Course Review SIP (TCEQ, 2004), based on attainment of the 1-hour ozone standard, and associated emissions trading programs approved by the EPA on 6 September 2006 (EPA, 2006). In this SIP revision, the emissions budgets for NO_x and VOC are based on emissions inventories for 1999 updated for the year 2000, where appropriate, and projected 2007. For moderate nonattainment areas, such as the HGB nonattainment area, the attainment year under the 8-hour ozone standard should be 2009. However, the emissions inventory in the most recently approved SIP is based on the attainment year 2007, and thus the budgets in the applicable categories and subcategories of the emissions inventory for 2007 were used in this analysis to represent the emissions budgets for the attainment year 2009.

The inventory of emissions of NO_x and VOC is summarized in the SIP from the emissions inventories for the five general categories of emission sources: stationary point, area, on-road mobile, nonroad mobile, and biogenics. The Non-road Mobile emissions inventory includes emissions from equipment associated with agricultural, aircraft, commercial, construction, ground support (airport), industrial, lawn and garden, railroad maintenance, logging, locomotives, oil and gas, recreational, and recreational marine equipment. As discussed in the 2004 SIP revision, nonroad mobile sources are a subset of the area source category. The 2007 HGB Ship emissions inventory is based on the 1997 Houston Galveston Area Vessel Emissions Inventory data from a detailed shipping emissions project described in the previous December 2000 SIP revision and follow-on work performed under the same project (TCEQ, 2000). This vessel emissions

inventory includes emissions from ocean-going vessels, dredges (main engine, generators, and auxiliary engines), tugboats, towboats, and other commercial marine vessels.

Based on information provided in the 2004 SIP revision, the motor vehicle emissions budget for 2007 is 186.13 tons per day (tpd) of NO_x and 89.99 tpd of VOC. The area source emissions weekday budget for 2007 is 144.86 tpd day of NO_x and 234.49 tpd of VOC. This area source emissions budget is further broken out in the SIP as shown on Table 4:

TABLE 4

SIP 2007 WEEKDAY HGB NONATTAINMENT AREA SOURCE EMISSIONS SUMMARY[1]
(tpd)

SIP Area Source Emissions Categories	NO_x	VOC
Low-level Nonroad Mobile (not including ships)	64.53	50.62
2007 HGB Ships	40.03	0.96
Area Sources (other than nonroad mobile sources and ships)	40.3	182.86
TOTALS	144.86	234.49

[1]TCEQ, 2004.

As shown in Table 2, the estimate of annual emissions of NO_x during the Port Freeport Channel Widening Project is 430.67 tpy to occur in 2008. For comparison to the SIP emissions budgets, this estimate is broken out by category of emissions for comparison to the SIP emissions budgets as shown on Table 5.

As shown on Table 5, NO_x emissions from the project dredging activities during 2008 would represent less than 3% of the 2007 HGB Ship emissions budget and about 63% of the estimated portion of the emissions budget for Brazoria County for ship emissions. The HGA project nonroad mobile equipment emissions would represent about 0.03% of the SIP 2007 Nonroad Emissions Budget for NO_x and about 0.4% of the nonroad portion of the estimated emission budget for Brazoria County. Combined emissions from project area sources including emissions from dredging activities and land-side equipment would represent about 0.8% of the total HGA SIP 2007 Area Source Emissions Budget and about 24% of the estimated portion of the emissions budget for Brazoria County. Air emissions from employee commuter vehicles would represent about 0.0004% of the HGA SIP 2007 Motor Vehicle Emissions Budget; about 0.01% of the estimated portion of the emissions budget for Brazoria County.

Based on an evaluation of the proposed project emissions and consideration of the interaction and information exchanged during the meetings and other correspondence with the TCEQ and the EPA, it is believed that the total of direct and indirect emissions of NO_x resulting from the USACE action subject to this general conformity evaluation would result in a level of emissions that are within the emissions budgets in the most recently approved SIP revision. As the Port Freeport Channel Widening Project is not unusual in scope for an area like the HGB, it is anticipated that emissions from each year of the project

TABLE 5

PROJECT NO_X EMISSIONS COMPARED TO SIP 2007
WEEKDAY AREA SOURCE EMISSIONS BUDGET[1]

SIP Area Source Emissions Categories	Project Activity	2008 Maximum Annual NO_x Emissions (tpy)	2008 Maximum Annual NO_x Emissions (tpd)	HGA SIP Emissions Budget (tpd)	% of HGA SIP Emissions Budget*	Brazoria County SIP Emissions Budget** (tpd)	% of Brazoria County SIP Emissions Budget*
HGB Ships	Dredging Activities – Dredging Vessel Equipment and Dredging Support Vessels including Transit and Mobilization	430.08	1.18	40.03	2.9	1.87	63.1
Nonroad Mobile	Land-side Dredged Material Placement – Bulldozing Equipment	0.54	0.022	64.53	0.03	5.51	0.4
Area Source (All)	Subtotal Dredging and Nonroad Equipment	430.62	1.20	144.86	0.8	5.00	24.0
On-Road Mobile	On-Road – Employee Commuter Vehicles	0.05	0.0006	186.13	0.0003	7.97	0.01
	Totals	430.67	1.20				

[1]TCEQ, 2004.

*Percent of SIP Emissions Budget was calculated based on the maximum estimated emission rate for 2008.

** Information provided by the TCEQ by e-mail correspondence dated 27 February 2007 and 5 May 2007.

will be less than an increase of 10% of the VOC and NO_x emissions inventories for the entire HGB nonattainment area. As such, emissions from the activities subject to the USACE action would not be considered regionally significant for purposes of General Conformity. Therefore, it is expected that emissions from the project construction would not:

- Cause or contribute to new violation of any NAAQS in any area;
- Increase the frequency or severity of any existing violation of any NAAQS in any area; or
- Delay timely attainment of any NAAQS or interim emission reductions or other milestones in any area.

Pursuant to the General Conformity Rule (40 CFR 51.855), this Final General Conformity Determination is provided to demonstrate that the proposed Port Freeport Channel Widening Project will comply with the requirements of the General Conformity Rule and would be in conformity with the SIP. Based on a review of the initial Draft General Conformity Determination and supplemental information provided, the TCEQ has made a determination and has documented that the total of direct and indirect emissions from the action, or portion thereof, would result in a level of emissions which, together with all other emissions in the HGB nonattainment area, would not exceed the emissions budgets specified in the SIP. Therefore, the USACE has determined that the proposed project complies with the requirements of the General Conformity Rule; Section 176 of the CAA and the Federal and State regulations promulgated pursuant to this rule, and is in conformity with the currently approved HGA SIP.

8.0 REFERENCES

Martin Associates. 2007. Economic Benefits of Widening the Federal Port Freeport, Texas, Shipping Channel. Report prepared for HDR|Shiner Moseley. September 13, 2007

Texas Commission on Environmental Quality (TCEQ). 1999. General Air Quality Rules, Chapter 101, §101.30, "Conformity of General Federal Actions to State Implementation Plan." Effective 23, December 1999.

———. 2000. "Revisions to the State Implementation Plan (SIP) for the Control of Ozone Air Pollution," December, 2000.

———. 2004. "Revisions to the State Implementation Plan (SIP) for the Control of Ozone Air Pollution, Houston-Galveston-Brazoria Ozone Nonattainment Area," Adopted 1 December 2004.

U.S. Corps of Engineers (USACE), Galveston District. 2007. "Final Environmental Impact Statement for Proposed Port Freeport Channel Widening, Brazoria County, Texas," October 2007.

U.S. Environmental Protection Agency (EPA). 1993. 40 Code of Federal Regulations (CFR) Part 51, Subpart W "Determining Conformity of General Federal Actions to State or Federal Implementation Plans," 58 Federal Register (FR) 63,247, 30 November 1993.

———. 2000. "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data," EPA420-R-00-002, February 2000.

———. 2004 "Nonroad Emissions Model Draft NONROAD 2002 Support Document, "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling," April 2004.

———. 2006. "Approval and Promulgation of Air Quality Implementation Plans; Texas; Revisions to the Ozone Attainment Plan for the Houston-Galveston-Brazoria Nonattainment Area," 6 September 2006. FR, Volume 71, No. 172, Page 52670.

(This page left blank intentionally.)

Appendix A

Public Notice and Publisher's Affidavit

THE STATE OF TEXAS
COUNTY OF BRAZORIA

Before me, the undersigned authority, on this day personally appeared

Bill Cornwell

who, after being duly sworn, did depose and say:

My name is Bill Cornwell

Publisher of The Facts, a daily newspaper as that term is defined by Art. 28 a R.C.S. of Texas 1925, as amended, having a general circulation in Brazoria County and published in the City of Clute, County of Brazoria, State of Texas.

The attached printed matter is a true and correct copy of the publication of

Public Meeting

,

which was published and appeared in said newspaper, with publication being on the following date(s): November 20 & 27, 2006.

My fee is $88.00

Bill Cornwell

Given under my hand and seal of office on this 27th day of November, A.D. 2006.

Oneta Mullins
Notary Public in and for
Brazoria County, Texas.
My commission expires 12/07/09.

ONETA MULLINS NOTARY PUBLIC STATE OF TEXAS EXPIRES 12-07-2009

Channel Widening

VERIFIED & APPROVED
BY:

NOTICE OF Public Meeting and availability of Draft General Conformity Determination on a Department of Army permit for Widening the Freeport Ship Channel

Let us hear your comments on the proposed project and the draft Environmental Impact Statement

December 6, 2006
Freeport Community House
1300 W. 2nd Street
Freeport, Texas
Workshop – 5 p.m. to 6:45 p.m.
Formal hearing – 7:00 p.m.

The draft environmental statement and draft determination are available for review and comments. Find them at www.swg.usace.army.mil/reg/pn.asp or contact Mr. Sam Watson 409-766-3946, US Army Corps of Engineers, Galveston District, P.O. Box 1229, Galveston, TX 77553-1229. Written comments should be submitted to Mr. Watson by January 9, 2007

The Sentinel
P.O. Box 2964
Freeport, 77542, TX

Date: 11 - 20- 06
Invoice # N/A

INVOICE

Business: Port Freeport

Attention: Accounts Payable

Channel widening

Army Corps of Engineers Meeting Ad	**$252**

3 weeks

VERIFIED & APPROVED
BY:_____

Due Immediately Upon Receipt!
Thank You For Your Business!

$252 ✓ 11/27/06

Appendix B

TCEQ/EPA/Port Freeport Letters

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

RECEIVED
JAN 12 2007
AIR QUALITY PLANNING

JAN 10 2007

Mr. Sam J. Watson
Department of the Army
Galveston District, Corps of Engineers
P.O. Box 1229
Galveston, TX 77553-1229

RE: Draft General Conformity Determination/Port of Freeport Channel Widening Project

Dear Mr. Watson:

The U.S. Environmental Protection Agency received the Draft General Conformity Determination and supporting documentation for the Port of Freeport Channel Widening Project in a package dated November 7, 2006.

Since the proposed project is federally funded and will be located in the Houston/Galveston/Brazoria ozone nonattainment area (HGB), it is potentially subject to Federal and State General Conformity Regulations. Your analysis of nitrogen oxide (NOx) and volatile organic compound (VOC) emissions indicates that NOx emissions from this project will exceed the de minimis threshold of 100 tons per year in years 2007 and 2008. VOC emissions are not expected to be above de minimis levels. As a result, a General Conformity determination for NOx emissions is required pursuant to 41 Code of Federal Regulations Part 51.

We have reviewed the documents and find the estimated emissions from the proposed project to be well illustrated and quantified. In consultation with the Texas Commission on Environmental Quality (TCEQ), we support the position of TCEQ that these emissions, together with all other emissions in the nonattainment area, would not exceed the NOx emissions budget in the HGB State Implementation Plan (SIP) allocated to construction activities.

We recommend that Table 4 of Chapter 5, Preliminary General Conformity Determination, be revised to include SIP emissions budget information for Brazoria County, since the channel widening project specifically impacts Brazoria County. In the

interest of public disclosure, we feel this information would best allow for a direct comparison between project NOx emissions and the SIP emissions budget across the various area and nonroad source emissions categories, particularly ship and construction emissions.

I appreciate your cooperation in consulting with us and providing copies of the Draft Conformity Determination for this project. It is ultimately the responsibility of the TCEQ to make the final general conformity determination for this project per 30 Texas Administrative Code 101.30, and find that the HGB SIP budget can accommodate emissions associated with this project. If you have any questions, please feel free to contact me or Jeffrey Riley of my staff at (214) 665-8542.

Sincerely yours,

Thomas H. Diggs
Chief
Air Planning Section

cc: Theresa Pella
Texas Commission on Environmental Quality (MC-206)

Margie

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

January 9, 2007

Mr. Sam J. Watson
Department of the Army
Galveston District, Corps of Engineers
P.O. Box 1229
Galveston, TX 77553-1229

Subject: Preliminary General Conformity Determination/Port of Freeport Channel Widening Project

Dear Mr. Watson:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the Draft Environmental Impact Statement and associated preliminary General Conformity Determination and submits the following comments.

Because the project is limited to Brazoria County of the Houston/Galveston/Brazoria eight-hour ozone nonattainment area, the TCEQ compared the county specific area, non-road, and on-road numbers used to develop the 2004 Mid-Course Review State Implementation Plan to the projected nitrogen oxide (NOx) emissions for the Freeport Channel project. The Brazoria County portion of the SIP's total area, non-road, and on-road emissions budget is 19.75 tons/day. It is not clear in Table 4 of Chapter 5, Preliminary General Conformity Determination, if the total project emissions are estimated at 0.7608 tpd or 1.5218 tpd. In either situation, the Table should be clarified.

Although the project is anticipated to emit minimal emissions, such emissions will contribute to the HGB air shed and the Corps is encouraged to consider the use of newer or retrofitted construction and marine equipment to reduce NOx emissions.

Thank you for the opportunity to comment. If you have any questions, please contact Theresa Pella, Air Quality Planning Section Manager, at (512) 239-6985.

Sincerely,

for Susana M. Hildebrand, P.E.
Director
Air Quality Division

PORT FREEPORT℠
THE COAST IS CLEAR

P.O. BOX 615 • FREEPORT, TX 77542-0615
(979) 233-2667 • 1 (800) DOCKSID(E) • FAX: (979) 233-5625

March 15, 2007
Letter No. LMC-137

Ms. Susana Hildebrand, P.E.
Division Director
Air Quality Planning and Implementation Division
Texas Commission on Environmental Quality
MC 206
P.O. Box 13087
Austin, Texas 78711-3087

RE: Port Freeport Channel Widening – General Conformity Determination

Dear Ms. Hildebrand:

I am in receipt of your letter, dated January 9, 2007, in which you set forth certain measures to which Port Freeport was asked to commit that would help mitigate the air quality impacts of its proposed Channel Widening Project in Brazoria County, Texas.

Port Freeport agrees to encourage the use of construction contractors that already participate in the Texas Emissions Reduction Plan (TERP) grant program, and direct, through provisions included in its construction contracts, that construction contractors implement Best Management Practices relating to air quality. This includes recommending use of diesel fuels compliant with the Texas Low Emission Diesel program.

With this commitment, we understand that you will notify the US Army Corps of Engineers by letter that the TCEQ conditionally certifies that emissions are accommodated in the State Implementation Plan (SIP).

We appreciate your attention to this matter and if you need any further information from us, please contact me or Ruben Velasquez of PBS&J at (512) 327-6840.

Very truly yours,

Lisa McMichael, Environmental Coordinator
Brazos River Harbor Navigation District

cc: David M. Knuckey, Director of Engineering
Mr. Sam Watson, USACE
Ms. Peggy Wade, USEPA
Mr. Ruben I. Velasquez, P.E., PBS&J
rf

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1229
GALVESTON, TEXAS 77553-1229

October 11, 2007

REPLY TO
ATTENTION OF:

Policy Analysis Section

SUBJECT: Permit 23752; Proposed Widening of the Freeport Harbor Ship Channel; Environmental Impact Statement – Supplemental Information

Mr. David C. Schanbacher, P.E.
Chief Engineer/Deputy Director
MC 168
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Mr. Schanbacher:

A Draft Environmental Impact Statement (DEIS) was submitted to the Environmental Protection Agency (EPA) and published in the Federal Register on November 9, 2006. The subject matter of the DEIS was the proposed widening of the Freeport Ship Channel by Port Freeport. During the design process for this project, project details that were not addressed in the DEIS were identified and will subsequently be addressed in detail in the Final Environmental Impact Statement (FEIS). These project details are reflected in the revised project drawings (Attachment A). The intent of this correspondence is to notify the Texas Commission on Environmental Quality (TCEQ) of actions that were not addressed in the DEIS, that may require concurrence from TCEQ.

I. Disposal of Clay Balls in the Existing Seaway Placement Area

Port Freeport is proposing to nourish the beach in front of the existing Seaway Placement Area on Quintana Island. This action has been coordinated with USFWS. Three hundred thousand (300,000) cubic yards of sandy material from the proposed dredging project will be placed at this location. During the beach nourishment process, it is likely that clay balls will be discharged from the dredge pipe onto the beach. The contractor will be responsible for collecting and disposing of clays balls that accumulate on the beach with diameters 2 inches or greater in the existing Seaway Placement Area (See Attachment A, Sheet 8 of 9). Clay balls will be removed by the contractor on a daily basis during the discharge period and on a weekly basis for two months following the discharge period. The process will not overlap with the turtle nesting season. The maximum expected volume of the clay balls

that will be disposed of in the Seaway Placement Area is approximately 200 cubic yards. The method of collection and type of vehicle that will be used to haul clay balls to the placement area will depend on the volume of clay balls discharged on the beach. The largest vehicles that would be used to collect and haul the clay balls will be a front-end loader and 16 cubic yard dump truck, respectively. Assuming this worst-case scenario, off-highway construction emissions associated with this activity are estimated to result in 0.52 tpy on NO_x and 0.03 tpy VOC, both in 2007 (See Attachment B).

II. Burial of Dredge Pipe and Disposal of Material

A dredge pipe will need to be temporarily buried across the bottom of the channel during the beach nourishment phase of the project. The applicant has coordinated with the Brazos Pilots and U.S. Coast Guard to identify the proper location and methodology for this action. The dredge pipe will be submerged across the full width (400 feet) of the existing Jetty Channel between Stations 20+00 and 50+00. The highest point of the pipe will not be higher than 49 feet below Mean Low Tide.

A maximum of 10,000 cubic yards will be excavated to construct a trench to bury the dredge pipe. There are 2 alternative methods for accomplishing this work: 1) The material may be excavated mechanically with a clamshell/bucket dredge and carried offshore via a scow to be disposed of in Placement Area No. 1; and 2) The material may be excavated with a hydraulic cutterhead pipeline dredge and placed and temporarily stored in the area to be widened. A hopper dredge will then pick up the material and transport it to its permanent placement site offshore at Placement Area No. 1 (See Attachment A, Sheet 6 of 9).

Additional air emissions estimates associated with each of these options are provided in Attachment B. Dredging of the temporary trench using Option 1 (mechanical excavation and placement in ODMDS) is expected to increase emissions associated with dredging activities by approximately 0.07 percent. Option 2 (hydraulic excavation and temporary placement) is expected to increase emissions associated with dredging activities by approximately 0.15 percent.

III. Disposal of Rock and Other Debris

Port Freeport expects to encounter minimal quantities of rock and other debris during construction. Incidental rock with diameters less than 18 inches will be disposed of offshore in Placement Area No. 1. Rock and other debris with diameters greater than 18 inches will be become property of the contractor and will be disposed of in an existing, regulated municipal or county landfill. It is possible that at least one automotive frame will need to be removed from the channel. Automotive parts and other similar materials that may be recovered from the channel will either be disposed of by the contractor in an existing regulated municipal or county landfill, or in a legally operating scrap yard.

IV. Additional Maintenance Dredging

After the widening of the channel is completed, Port Freeport anticipates the need to perform maintenance dredging of the improved channel to remove any shoaling that has occurred during the construction period, prior to turning the widened channel over to the Federal government for maintenance. The removal of this shoaled material will act as the maintenance cycle for that year. Currently, maintenance dredging is conducted within the channel by the U.S. Army Corps of Engineers on a cyclical basis, normally at a frequency of 10-months or greater, with material taken to an approved disposal site (Placement Area No. 1-A as seen in Attachment A). However, it is anticipated that widening of the channel will result in an additional 984,000 cubic yards per year of future maintenance dredged material going to the disposal site with a corresponding increase in hours of operation of the maintenance dredging equipment. Modeling indicates that the additional material will fit within the existing maintenance material Ocean Dredged Material Disposal Site (Placement Area No. 1-A as seen in Attachment A), in accordance with parameters agreed upon with EPA.

Additional air emissions estimates associated with removal of the additional maintenance material are provided in Attachment B. Emissions estimates assumed the material would be removed using a hopper dredge. Modeling indicates that removal of this additional material would increase the emissions, as reported in the initial evaluation, by approximately 8 percent. It should be noted that following the proposed channel widening, future maintenance cycles would continue with the corresponding increase in emissions over those created by current maintenance activities.

We ask that you please provide concurrence that the project, as amended still fits within the State Implementation Plan for this region. Please provide concurrence by written letter, fax or email addressed to Mr. Sam J. Watson (U.S. Army Corps of Engineers Regulatory Project Manager). Mr. Watson's email address is: Sam.Watson@swg02.usace.army.mil. Please feel free to call Sam Watson at 409-766-3946 with any questions or comments.

Sincerely,

10/12/07
for CUTLER
CESWG-PE-RB

Casey Cutler
Chief, Policy Analysis Section

Enclosures 2

(Copies Furnished – See Page 4)

Copies Furnished:

Mr. Glenn Shankle, Executive Director, Texas Commission on Environmental Quality, Mail Code 109, P.O. Box 13087, Austin, TX 78711-3087

Ms. Donna Phillips, Regional Director, Texas Commission on Environmental Quality, 5425 Polk Ave., Ste. H, Houston, TX 77023-1452

Mr. Robbie Drake, Director of Environmental Health, Brazoria County Health Department, Environmental Health Department, 111 E Locust Bldg A-29, Suite 270, Angleton, TX 77515

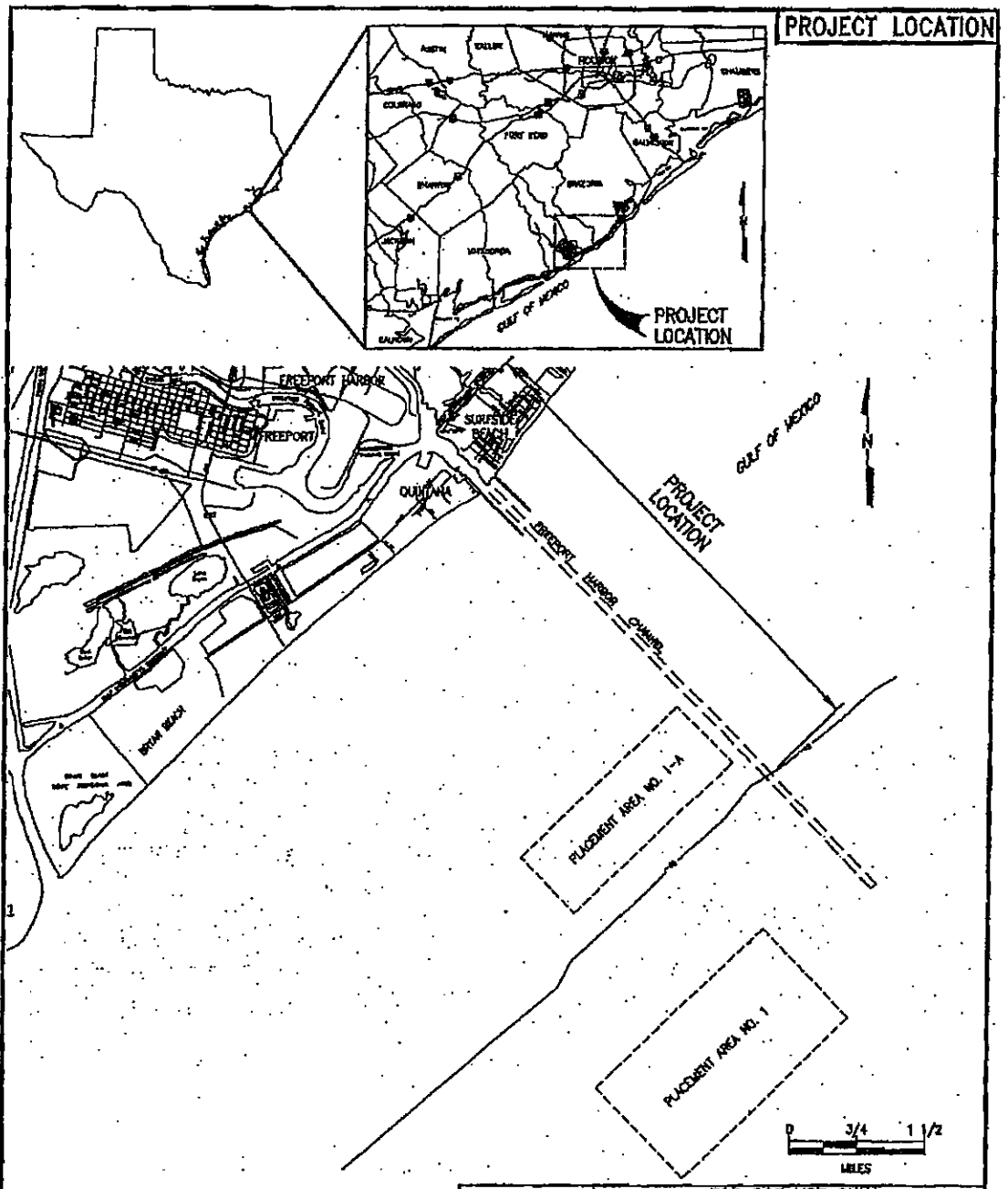
Mr. Alan C. Clark, Director of Transportation Planning, Houston-Galveston Area Council, P.O. Box 22777, Houston, TX 77227-2777

Mr. Jeff Riley, U.S. Environmental Protection Agency – Region 6, 1445 Ross Avenue, Suite 1200, Mail Code: 6PDL, Dallas, TX 75202-2733

Mr. Thomas Diggs, U.S. Environmental Protection Agency – Region 6, 1445 Ross Avenue, Suite 1200, Mail Code: 6PDL, Dallas, TX 75202-2733

Mr. Michael Jansky, U.S. Environmental Protection Agency – Region 6, 1445 Ross Avenue, Suite 1200, Mail Code: 6PDL, Dallas, TX 75202-2733

ATTACH. - A



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FOR COE USE ONLY

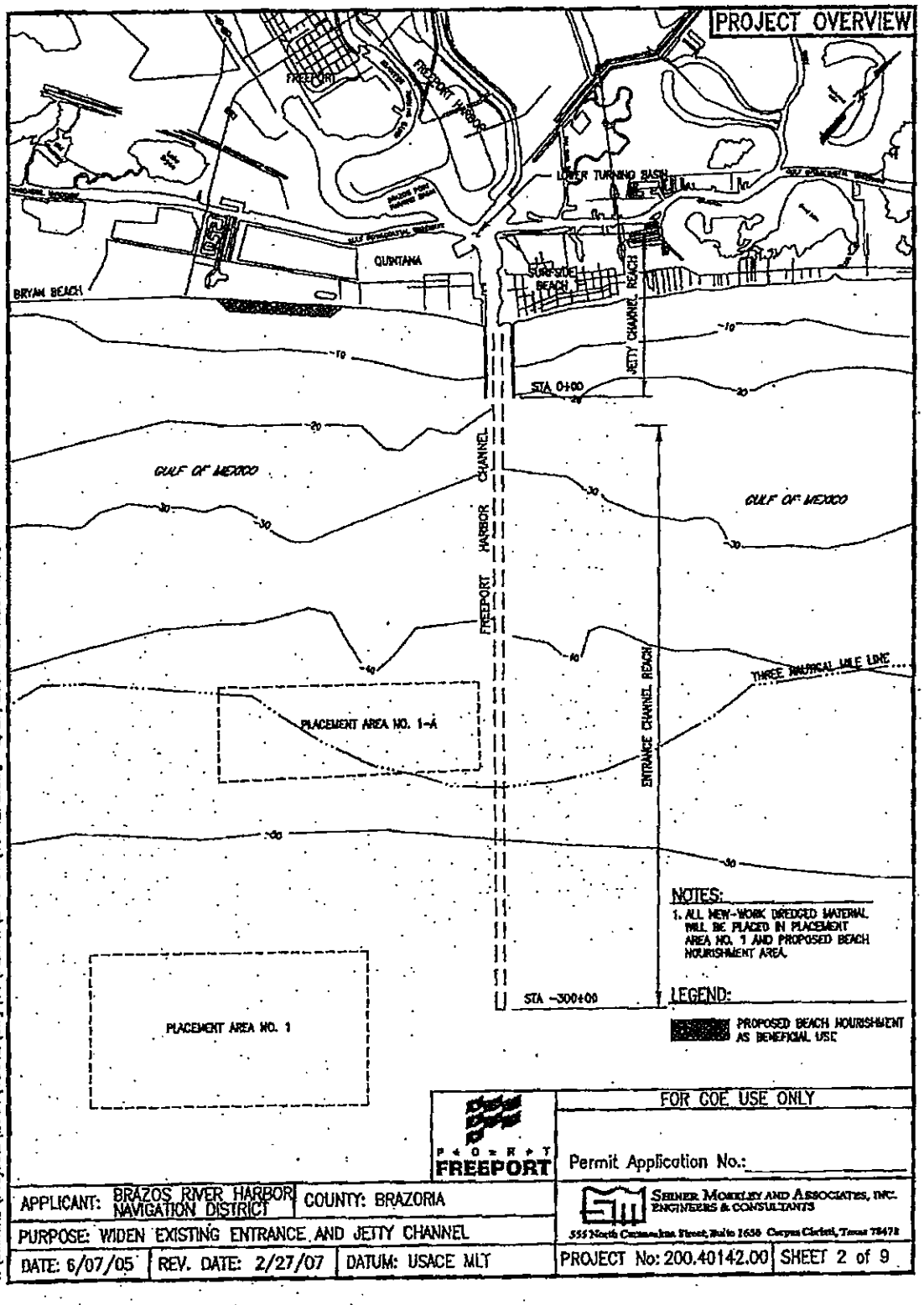
Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT | COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

SHINER MOSELEY AND ASSOCIATES, INC.
ENGINEERS & CONSULTANTS
555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

DATE: 6/07/05 | REV. DATE: 2/27/07 | DATUM: USACE MLT | PROJECT No: 200.40142.00 | SHEET 1 of 9



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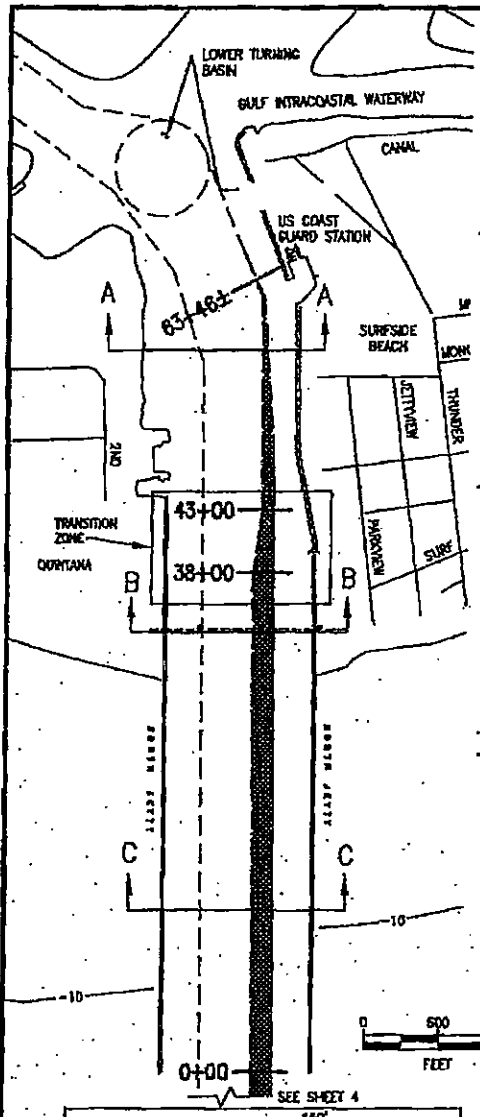
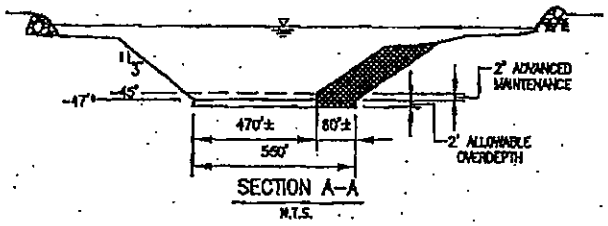
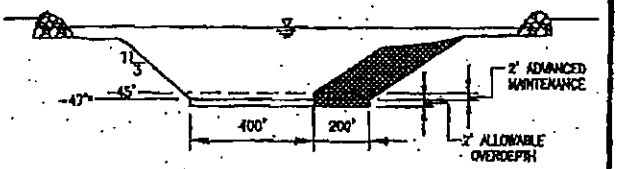
JETTY CHANNEL REACH

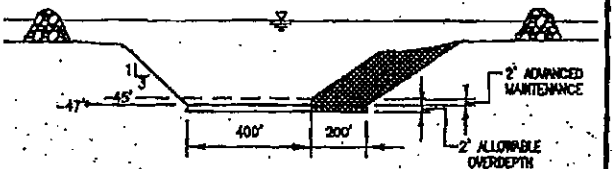




SECTION A–A
N.T.S.



SECTION B–B
N.T.S.



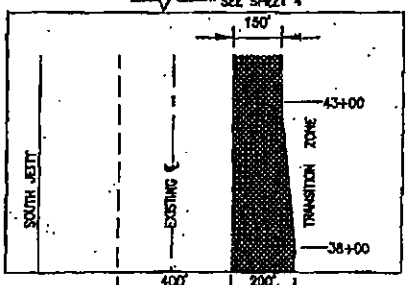
SECTION C–C
N.T.S.

* BASED ON -45' PLUS 2' ADVANCED MAINTENANCE

LEGEND:

PROPOSED DREDGE INCREMENT

EXISTING PIPELINE



JETTY CHANNEL WIDENING SUMMARY	
REACH	WIDEN TO
0+00 TO 38+00	900 FT.
38+00 TO 43+00	TRANSITION FROM 600 FT. TO 550 FT.
43+00 TO 63+48	550 FT. (±)

PORT FREEPORT

FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT | COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

SHINER MOSELEY AND ASSOCIATES, INC.
ENGINEERS & CONSULTANTS
555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

DATE: 6/07/05 | REV. DATE: 2/15/07 | DATUM: USACE MLT | PROJECT No: 200.40142.00 | SHEET 3 of 9

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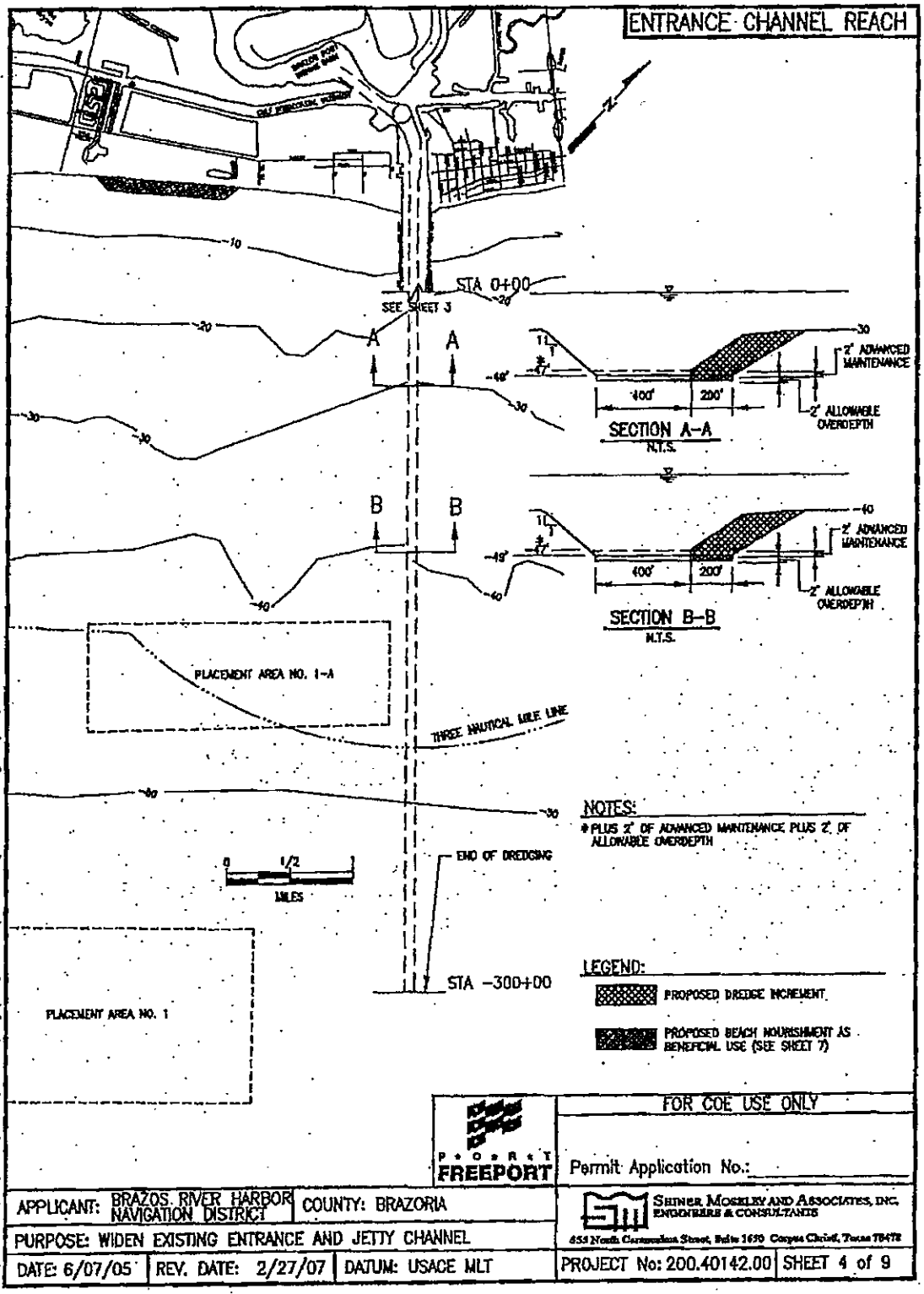
ENTRANCE CHANNEL REACH
SEE SHEET 3
STA 0+00
STA -300+00
A
A
B
B
SECTION A-A
N.T.S.
SECTION B-B
N.T.S.
2' ADVANCED MAINTENANCE
2' ALLOWABLE OVERDEPTH
400'
200'
PLACEMENT AREA NO. 1-A
PLACEMENT AREA NO. 1
THREE NAUTICAL MILE LINE
END OF DREDGING
0 1/2
MILES
NOTES:
* PLUS 2' OF ADVANCED MAINTENANCE PLUS 2' OF ALLOWABLE OVERDEPTH
LEGEND:
PROPOSED DREDGE INCREMENT
PROPOSED BEACH NOURISHMENT AS BENEFICIAL USE (SEE SHEET 7)
FOR COE USE ONLY
Permit Application No.:
PORT FREEPORT
APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT
COUNTY: BRAZORIA
PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL
DATE: 6/07/05
REV. DATE: 2/27/07
DATUM: USACE MLT
SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS
PROJECT No: 200.40142.00
SHEET 4 of 9
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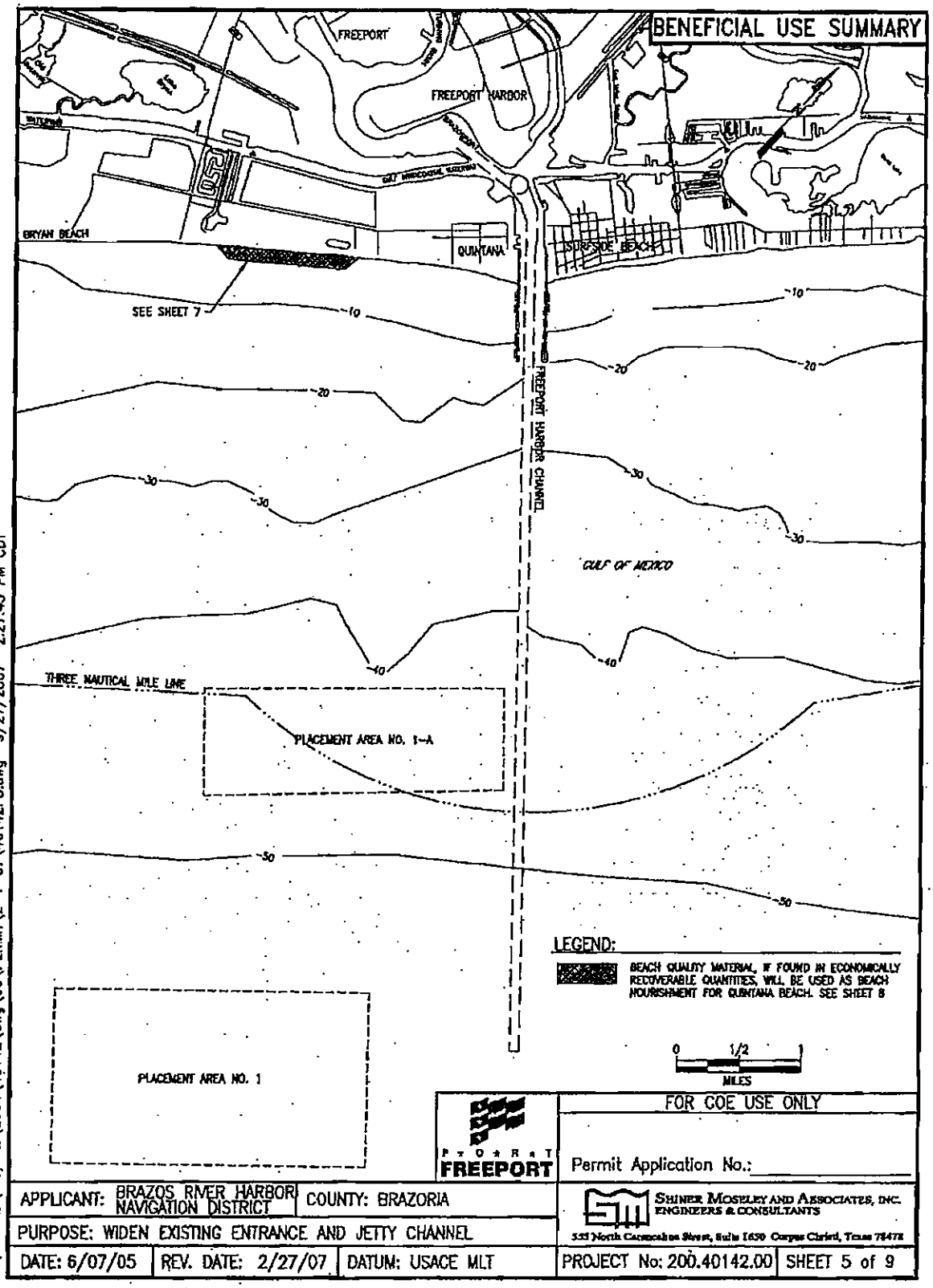

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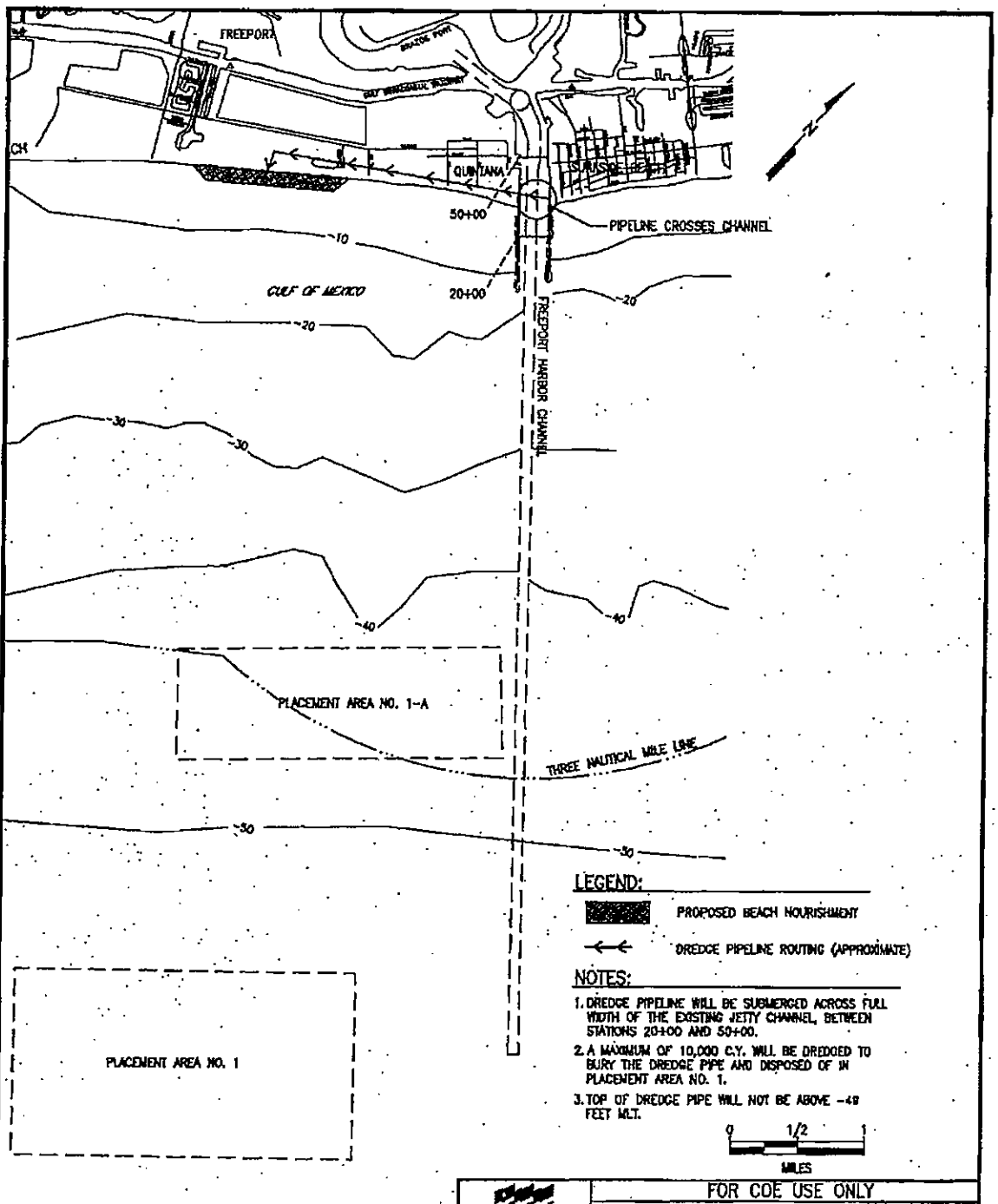

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PORT FREEPORT

FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT | COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 6/07/05 | REV. DATE: 3/27/07 | DATUM: USACE MLT

SHINER MOSELEY AND ASSOCIATES, INC.
ENGINEERS & CONSULTANTS
555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

PROJECT No: 200.40142.00 | SHEET 6 of 9

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PORT FREEPORT

FOR COE USE ONLY

Permit Application No.:

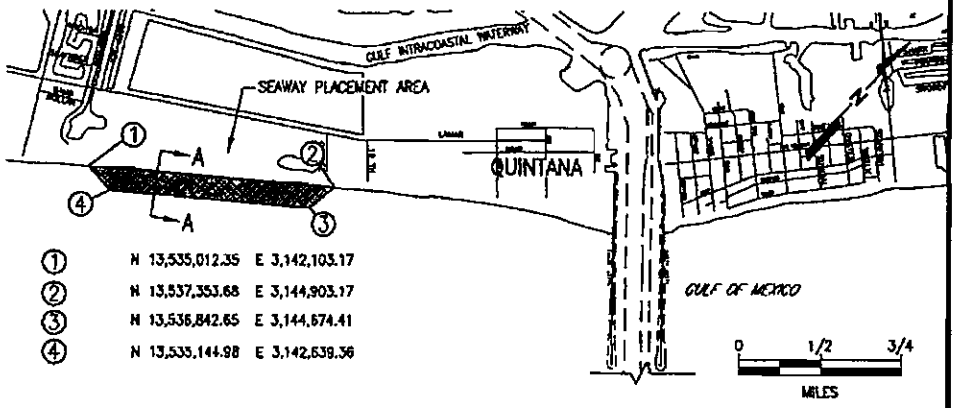
APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT | COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

SHINER MOSBLEY AND ASSOCIATES, INC.
ENGINEERS & CONSULTANTS
555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478

DATE: 6/07/05 | REV. DATE: 2/15/07 | DATUM: USACE MLT | PROJECT No: 200.40142.00 | SHEET 7 of 9

BENEFICIAL USE BEACH NOURISHMENT



① N 13,535,012.35 E 3,142,103.17
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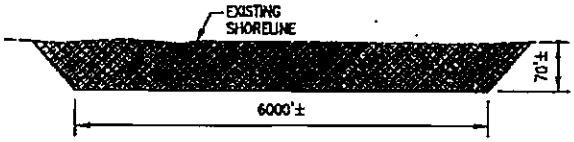
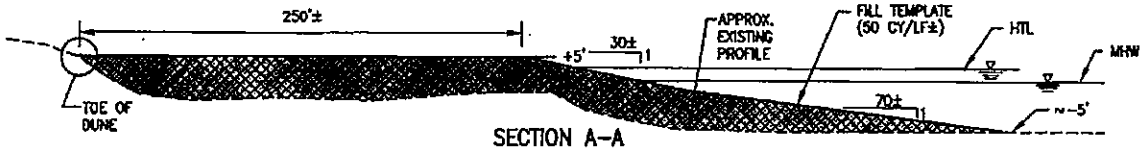
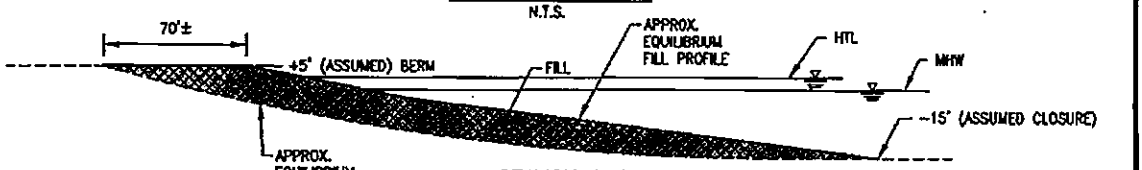


PLAN VIEW AT INITIAL EQUILIBRIUM
N.T.S.



SECTION A–A
INITIAL PLACEMENT
N.T.S.



SECTION A–A
AT INITIAL EQUILIBRIUM
N.T.S.

NOTES:

1. MHW = 3.2' MLT; HTL = 5.0' MLT
2. BEACH FILL LENGTH WILL DEPEND ON THE AMOUNT OF RECOVERABLE BEACH QUALITY MATERIAL; 300,000 CY WOULD CONSTRUCT APPROXIMATELY 6000 LF OF BEACH AT A FILL TEMPLATE OF 50 CY/LF. THIS WOULD CREATE APPROXIMATELY 9± ACRES OF BEACH AREA AT INITIAL EQUILIBRIUM.
3. CLAY BALLS WILL BE REMOVED BY CONTRACTOR AND PLACED WITHIN THE SEAWAY PLACEMENT AREA.

LEGEND:

PROPOSED BEACH NOURISHMENT

PORT FREEPORT

FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT	COUNTY: BRAZORIA	SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS	
PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL		555 North Carancahua Street, Suite 1650 Corpus Christi, Texas 78478	
DATE: 6/07/05	REV. DATE: 2/27/07	DATUM: USACE MLT	PROJECT No: 200.40142.00 | SHEET 8 of 9

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ADJACENT PROPERTY OWNERS

Property ID	Tax ID	Owner	Mailing Address
	0098-0005-005	Vaughan, Carl III	
	0098-0013-800	Brazoria County	111 E Locust St, Angleton, TX 77515
	2103-0014-000	Tudor, Edwin L & Patricia	4723 Heatherbrook Dr, Dallas, TX 75244-7637
	2103-0020-000	Village of Surfside Beach	1304 Monument Dr, Freeport, TX 77541-9522
	2103-0021-000	USFW Branch of Water Resources	P.O. Box 1306, Albuquerque, NM 87103-1306
R190995	2103-0021-110	USFW Branch of Water Resources	P.O. Box 1306, Albuquerque, NM 87103-1306
R190995	2103-0023-000	Graham, James C and Wanda L	1306 W Birch Rd, Rogers, AR 72758-5018
R190998	2103-0023-115	Vaughan, Carl III	
	2103-0034-000	Spring Branch Wildlife Preserve	8810 Carousel Lane, Houston, TX 77080-8001
R216644	5035-0001-000	Stevens, FK % Frank W Stevens	P.O. Box 878, Angleton, TX 77516-0878
R216645	5035-0002-000	Stevens, Elizabeth S % Guy Stevens	222 E Riverside Dr, Austin, TX 78704-8924
R216646	5035-0003-000	Carlton B H III	1230 Canal Dr, Freeport, TX 77541-7260
R216647	5035-0004-000	Tudor, Edwin L & Patricia	4723 Heatherbrook Dr, Dallas, TX 75244-7637
R240542	7163-0101-000	Gonzalez, Kenneth A	P.O. Box 1024, Freeport, TX 77542-1024
R240543	7163-0105-000	Reynolds, Jeffery M	807 Burnet St, Quintana, TX 77541-8104
	7163-0121-000	Taylor, Christie Waite	4212 San Felipe St #444, Houston, TX 77027
R240557	7163-0130-000	Gonzalez, Kenneth A	P.O. Box 1024, Freeport, TX 77542-1024
	7163-0171-000	Ramey, TB Jr.	P.O. Box 8023, Tyler, TX 75711-8023
R240563	7163-0191-000	Bryan, Cassie Perry % JP Bryan Est	P.O. Box 136, Angleton, TX 77516-0136
	7163-0201-000	no owner listed	
	7163-0231-000	no owner listed	
	7163-0531-000	Gonzalez, Kenneth A	P.O. Box 1024, Freeport, TX 77542-1024
	7163-0534-000	Brazoria County	111 E Locust St, Angleton, TX 77515
	7163-0560-000	Gonzalez, Kenneth A	P.O. Box 1024, Freeport, TX 77542-1024
	7163-0561-000	Brazoria County	111 E Locust St, Angleton, TX 77515
R240611	7163-0580-000	Quintana Marine Inc	
	7875-0582-000	Berksdale, Woody T and Leta W	2702 Evergreen Cliff Trail, Kingwood, TX 77345
	7875-0585-000	Bolcar, Blinn S	110 Post Oak Dr, Lake Jackson, TX 77566-6160
	7875-0587-000	Parsons, Daniel C	300 Parkview Rd, Surfside Beach, TX 77541-9577
	7875-0591-000	Parsons, Daniel C	300 Parkview Rd, Surfside Beach, TX 77541-9577
	7875-0593-000	Murray Catherine and Larry F Ostara	12703 Grand Cross Lane, Houston, TX 77072-4809
R254822	7875-0621-110	Cradle of Texas Conservancy	121 Hickory St, Lake Jackson, TX 77566-5843
R254827	7875-0623-000	Village of Surfside Beach	1304 Monument Dr, Freeport, TX 77541-9522
	7875-0623-111	Village of Surfside Beach	1304 Monument Dr, Freeport, TX 77541-9522
		U.S. Coast Guard	Freeport / Surfside
		Texas General Land Office	1700 N. Congress Avenue, #840, Austin, TX 78701-1495
		DOW Chemical	2301 Brazosport Blvd, Freeport, TX 77541
		Texas Department of Transportation	125 E. 11th Street, Austin, TX 78701-2483

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PORT FREEPORT

FOR COE USE ONLY

Permit Application No.:

APPLICANT: PORT OF FREEPORT | COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING SHIP CHANNEL

SHINNERS MOSELEY AND ASSOCIATES, INC.
ENGINEERS & CONSULTANTS
555 North Carancahua Street, Suite 1630 Corpus Christi, Texas 78478

DATE: 6/07/05 | REV. DATE: 2/15/07 | DATUM: USACE MLT | PROJECT No: 200.40142.00 | SHEET 9 of 9

ATTACH - B

Assumptions for Equipment Engines, Load Factors, and Hours of Operation:
Trenching and Material Disposal for Routing Dredging Pipeline Across Jetty Channel
OPTION 1: MECHANICAL DREDGING

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per Day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Mechanical Dredging	Bucket Crane	1	500	Main Power	Diesel	0.8	500	18	100%	1	18
				Auxiliary	Diesel	0.4	205	18	100%	1	18
	Large Tug	1	2,000	Propulsion	Diesel	0.8	2,000	18	100%	1	18
				Auxiliary	Diesel	0.4	67	18	100%	1	18
	Runabout (Small)	1	50	Propulsion	Diesel	0.4	50	18	100%	1	18
				Auxiliary	Diesel	0.2	17	18	100%	1	18
Total Engine Hours											104

Notes:
1. Days of operation are determined assuming 8,000 CY/day production rate for the bucket crane.
2. Estimate based on placement of dredged material in offshore placement area.

Assumptions for Equipment Engines, Load Factors, and Hours of Operation:
Trenching and Material Disposal for Routing Dredging Pipeline Across Jetty Channel
OPTION 2: PIPELINE DREDGING

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per Day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Pipeline Dredging (Phase 1)	24" Cutterhead	1	4,000	Main Power	Diesel	0.8	2,560	20	100%	0.5	10
				Secondary	Diesel	0.4	160	20	100%	0.5	10
				Auxiliary	Diesel	0.4	750	24	100%	0.5	12
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	67	20	100%	0.5	10
				Auxiliary	Diesel	0.2	67	20	100%	0.5	10
	Crew/Survey Boat (Runabouts)	1	50	Propulsion	Diesel	0.4	50	20	100%	0.5	10
				Auxiliary	Diesel	0.2	17	20	100%	0.5	10
Hopper Dredging (Phase 2)	Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	0.25	2
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	0.25	3
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	0.25	3
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	0.25	3
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	0.25	3
	Runabout (Large)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	0.25	5
				Auxiliary	Diesel	0.2	17	20.4	100%	0.25	5
	Shrimp Boat (Turtle Trawl)	1	1,000	Propulsion	Diesel	0.4	1,000	24	100%	0.25	6
				Auxiliary	Diesel	0.2	200	24	100%	0.25	6
Total Engine Hours											108

Notes:
1. Days of operation are determined assuming 25,000 CY/day production rate for the cutterhead dredge and 40,000 CY/day production rate for the hopper dredge.
2. Estimate based on placement of dredged material into Reach 1 or 2 with cutterhead dredge and then to offshore placement area with hopper dredge.

Assumptions for Equipment Engines, Load Factors, and Hours of Operation
Additional 984,000 cy/yr Maintenance Dredging for 600-ft Channel

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per Day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Additional Maintenance Dredging	Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	25	224
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	25	286
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	25	286
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	25	264
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	25	336
	Runabout (Large)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	25	510
				Auxiliary	Diesel	0.2	17	20.4	100%	25	510
	Shrimp Boat (Turtle Trawl)	1	1,000	Propulsion	Diesel	0.4	1,000	24	100%	25	600
				Auxiliary	Diesel	0.2	200	24	100%	25	600
Total Engine Hours											3,816

Notes:
1. Days of operation are determined assuming 40,000 CY/day production rate for a hopper dredge removing unconsolidated, predominantly silty dredged material.

Total Emissions from Marine Equipment - Comparison of Initial Evaluation to Additional Work Options
Freeport Channel Widening Project
(Tons per Year)

Initial Evaluation

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1	300,000 CY of Silty Sand (placed on beach)	Cutterhead	1.66	10.60	0.24	0.26	1.80	0.20
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	0.69	6.24	0.14	0.15	1.03	0.07
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	46.72	412.61	9.35	9.86	68.43	4.68
		TOTAL	49.07	429.45	9.73	10.27	71.26	4.94

Addition of Pipeline Trench - Option 1 (Mechanical Excavation)

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1	300,000 CY of Silty Sand (placed on beach)	Cutterhead	1.66	10.60	0.24	0.26	1.80	0.20
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	0.69	6.24	0.14	0.15	1.03	0.07
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	46.72	412.61	9.35	9.86	68.43	4.68
Trench - Option 1	8,000 CY of Material (placed in ODMDS)	Bucket Crane	0.03	0.31	0.01	0.01	0.05	0.003
		TOTAL	49.10	429.76	9.74	10.27	71.31	4.95
	Increase in Emissions from Initial Evaluation		0.03	0.31	0.01	0.01	0.05	0.003
	% Increase in Emissions from Initial Evaluation		**0.07%**	**0.07%**	**0.07%**	**0.07%**	**0.07%**	**0.06%**

Addition of Pipeline Trench - Option 2 (Hydraulic Excavation)

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1	300,000 CY of Silty Sand (placed on beach)	Cutterhead	1.66	10.60	0.24	0.26	1.80	0.20
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	0.69	6.24	0.14	0.15	1.03	0.07
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	46.72	412.61	9.35	9.86	68.43	4.68
Trench - Option 2	12,500 CY of Silty Sand/Clay (placed for pickup)*	Hydraulic	0.036	0.27	0.006	0.0066	0.046	0.004
	10,000 CY of Silty Sand/Clay (placed in ODMDS)	Hopper	0.038	0.36	0.008	0.009	0.059	0.004
		TOTAL	49.14	430.08	9.75	10.28	71.37	4.95
	Increase in Emissions from Initial Evaluation		0.07	0.63	0.014	0.015	0.105	0.008
	% Increase in Emissions from Initial Evaluation		**0.15%**	**0.15%**	**0.15%**	**0.15%**	**0.15%**	**0.15%**

* Actual volume is not expected to exceed 10,000 cubic yards.

Additional Maintenance Dredging

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
Additional Maintenance	984,000 CY of Silty Sand/Clay (placed in ODMDS)	Hopper	3.83	35.78	0.81	0.85	5.92	0.37
		TOTAL	3.83	35.78	0.81	0.85	5.92	0.37
	% Increase in Emissions from Initial Evaluation		**7.8%**	**8.3%**	**8.3%**	**8.3%**	**8.3%**	**7.4%**

General Conformity Emissions Summary - Comparison of Different Options to Initial Evaluation
Freeport Channel Widening Project

Category	Equipment	Initial Evaluation				With Pipeline Trenching Option 1				With Pipeline Trenching Option 2			
		Tons per Year				Tons per Year				Tons per Year			
		NO_x		VOC		NO_x		VOC		NO_x		VOC	
		2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Marine Vessels - Dredging	Dredges	63.43	154.96	0.58	1.36	63.43	155.03	0.58	1.36	63.43	155.40	0.58	1.36
	Anchor Tender	0.097	--	0.003	--	0.097	--	0.003	--	0.097	--	0.003	--
	Runabouts	1.53	3.73	0.040	0.095	1.53	3.73	0.040	0.095	1.53	3.74	0.040	0.095
	Tugs	6.33	--	0.09	--	6.33	0.23	0.09	0.002	6.33	0.03	0.09	0.001
	Shrimpboat	13.60	37.52	0.38	1.05	13.60	37.52	0.38	1.05	13.60	37.54	0.38	1.05
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Marine Vessels - Oceangoing	Dredges	73.21	72.65	0.65	0.64	73.21	72.65	0.65	0.64	73.21	72.78	0.65	0.64
	Anchor Tender	0.039	--	0.001	--	0.039	--	0.001	--	0.039	--	0.001	--
	Runabouts	0.01	--	0.00	--	0.01	--	0.00	--	0.01	--	0.00	--
	Tugs	2.36	--	0.06	--	2.36	--	0.06	--	2.36	--	0.06	--
	Shrimpboat	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Construction (Off-Highway)	Placement	0.52	--	0.03	--	0.52	--	0.03	--	0.52	--	0.03	--
	Clayball/Debris Removal					--	0.04	--	0.003	--	0.04	--	0.003
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mobile	Employee Vehicles	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.03
Total for Each Option		**161.14**	**268.88**	**1.87**	**3.17**	**161.14**	**269.23**	**1.87**	**3.18**	**161.14**	**269.55**	**1.87**	**3.18**
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maintenance Vessels - Dredging	Dredges	--	19.93	--	0.17	--	19.93	--	0.17	--	19.93	--	0.17
	Anchor Tender	--	--	--	--	--	--	--	--	--	--	--	--
	Runabouts	--	0.48	--	0.012	--	0.48	--	0.012	--	0.48	--	0.012
	Tugs	--	--	--	--	--	--	--	--	--	--	--	--
	Shrimpboat	--	2.39	--	0.07	--	2.39	--	0.07	--	2.39	--	0.07
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maintenance Vessels - Oceangoing	Dredges	--	12.99	--	0.11	--	12.99	--	0.11	--	12.99	--	0.11
	Anchor Tender	--	--	--	--	--	--	--	--	--	--	--	--
	Runabouts	--	--	--	--	--	--	--	--	--	--	--	--
	Tugs	--	--	--	--	--	--	--	--	--	--	--	--
	Shrimpboat	--	--	--	--	--	--	--	--	--	--	--	--
	Subtotal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total Maintenance		**0.00**	**35.78**	**0.00**	**0.37**	**0.00**	**35.78**	**0.00**	**0.37**	**0.00**	**35.78**	**0.00**	**0.37**
Total Project Emissions		**161.14**	**304.66**	**1.87**	**3.54**	**161.14**	**305.01**	**1.87**	**3.54**	**161.14**	**305.34**	**1.87**	**3.55**
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO ATTENTION OF:

December 13, 2007

Policy Analysis Section

SUBJECT: Permit 23752; Proposed Widening of the Freeport Harbor Ship Channel; General Conformity Determination - Project Update

Ms. Susana M. Hildebrand, P.E.
Director, Air Quality Division MC206
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Dear Ms. Hildebrand,

On behalf of the U.S. Corps of Engineers, Galveston District, I am providing this update with regard to the Port Freeport Channel Widening Project schedule for construction and General Conformity documentation.

The Port Freeport Channel Widening Project initially contemplated construction activities to occur for a duration of one year, starting in the 4th quarter of 2007 with completion in 2008. Information submitted to the Texas Commission on Environmental Quality (TCEQ) in the Draft General Conformity Determination documentation for this project included calculations showing estimated emissions of nitrogen oxides (NO_x) resulting from the project construction activities of 161.13 tons/year of NO_x occurring in 2007 and 268.88 tons/year of NO_x occurring in 2008, corresponding to the anticipated construction schedule.

It has become evident that the start of construction will not begin in 2007, and has been reprogrammed to begin in about March 2008. Based on information from the project sponsors, it is expected that the project may be completed in total during 2008 with no overlap to 2009. The corresponding breakout of NO_x emissions will also shift such that these emissions will all occur in 2008 (about 430 tons/year or so). However, there will be no change in the total emissions from the project beyond what we have already reported to the TCEQ; e.g., an incidental increase in NO_x emission from proposed pipeline trenching.

It is our understanding that the shift in the construction schedule and corresponding shift in NO_x emissions may still be accommodated in the Texas State Implementation Plan (SIP) because there would be no increase in emissions over those previously reported to the TCEQ and because

construction would not overlap into 2009. The shift in schedule and the corresponding shift in air contaminant emissions to 2008 would simply require an update to the General Conformity documentation as well as to the Environmental Impact Statement for this project.

In updating the General Conformity documentation, we propose to move forward with a Final General Conformity Determination; the final document to include the latest construction schedule and shift in NO_x emissions to 2008. The Final General Conformity Determination document would be published and noticed as a final determination and copies will be provided to the TCEQ, EPA, and others, as before. Our conclusion for purposes of conformity would be that even though there is a shift in NO_x emissions to 2008; there will no increase in total emissions and the project will be completed in its entirety in 2009. Therefore, the project emissions will be still be conformant with the SIP.

With this submittal, we request your written concurrence with this proposal. Assuming positive concurrence is received, we will move to complete and notice the Final General Conformity document.

Thank you very much for your consideration of this matter. If you should have any questions, please contact Mr. Sam Watson at 409-766-3946.

Sincerely,

Casey Cutler
Chief, Policy Analysis Section

CUTLER
CESWG PE RB

(Copy Furnished – See Page 3)

Copies Furnished:

Mr. Jeff Riley
U.S. Environmental Protection Agency – Region 6
1445 Ross Avenue
Suite 1200
Mail Code: 6PDL
Dallas, TX 75202-2733

Mr. Thomas Diggs,
U.S. Environmental Protection Agency – Region 6
1445 Ross Avenue
Suite 1200
Mail Code: 6PDL
Dallas, TX 75202-2733

APPENDIX C

TCEQ General Conformity Concurrence Letters

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 25, 2007

Colonel David C. Weston
District Commander
Galveston District
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: General conformity concurrence for the Port Freeport channel widening project

Dear Colonel Weston:

This letter provides general conformity concurrence for the proposed Port Freeport channel widening project. The Texas Commission on Environmental Quality (TCEQ) reviewed the project in accordance with Title 40 Code of Federal Regulations Part 93, and Title 30 Texas Administrative Code § 101.30 (30 TAC § 101.30) of the TCEQ general rules. The proposed project is located in the Houston-Galveston-Brazoria (HGB) area, which is classified as moderate nonattainment for ozone, and emissions are expected to be above the 100 tons-per-year *de minimis* threshold. Therefore, a general conformity analysis is required.

The TCEQ has determined, pursuant to 30 TAC §101.30(h)(1)(E)(i)(I), that emissions from the proposed project will not exceed the emissions from the applicable state implementation plan, the HGB Midcourse Review adopted by the TCEQ Commission December 1, 2004, and approved by the U.S. Environmental Protection Agency September 6, 2006. This finding is based upon information provided in a November 2006 draft general conformity determination prepared for the U.S. Army Corps of Engineers (USACE).

In support of the national ambient air quality standards, the TCEQ suggests the USACE adopt pollution prevention and/or reduction measures in conjunction with this and future projects, such as the following:

- encourage construction contractors to apply for Texas Emission Reduction Plan grants;
- establish bidding conditions that give preference to clean contractors;
- direct construction contractors to exercise air quality best management practices;
- direct contractors that will use tugboats during construction to use clean fuels;
- direct operators of the assist tugboats used in maneuvering dredge vessels to use clean fuels;
- select assist tugs based on lowest NO_x emissions instead of lowest price; and
- purchase and permanently retire surplus NO_x offsets prior to commencement of operations.

Lastly, I would appreciate receiving an update as appropriate as this project moves forward. Thank you for providing the information and staff assistance necessary for our review. I look forward to working with you in the future on any upcoming projects you may have that affect air quality in your district. If you require further assistance on this matter, please contact John Guerra of my staff at (512)239-1469 or jguerra@tceq.state.tx.us.

Sincerely,

For Susana M. Hildebrand P.E., Director
Air Quality Division

cc: Ms. Carolyn Murphy, Chief, Environmental Section, USACE, Galveston District
Mr. Jeffrey Riley, EPA Region 6

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

November 19, 2007

Mr. Sam J. Watson
Regulatory Project Manager
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: Revised general conformity concurrence for the Port Freeport channel widening project

Dear Mr. Watson:

This letter revises the May 25, 2007, general conformity concurrence for the Port Freeport channel widening project. The Texas Commission on Environmental Quality (TCEQ) reviewed the updated project as described in the October 11, 2007, correspondence, in accordance with Title 40 Code of Federal Regulations Part 93 and Title 30 Texas Administrative Code §101.30 (30 TAC §101.30) of the TCEQ general rules. The proposed additional maintenance dredging to the project is located in the Houston-Galveston-Brazoria (HGB) area, which is classified as moderate nonattainment for ozone, and emissions are expected to be above the 100 tons-per-year *de minimis* threshold. Therefore, a general conformity analysis is required.

The TCEQ has determined, pursuant to 30 TAC §101.30(h)(1)(E)(i)(I), that emissions from the proposed additions to the project will not exceed the emissions from the applicable state implementation plan, the HGB Midcourse Review adopted by the TCEQ Commission on December 1, 2004, and approved by the U.S. Environmental Protection Agency (EPA) on September 6, 2006. This finding is based upon information provided in the October 11, 2007, letter from the U.S. Army Corps of Engineers (USACE) outlining the additions to the project that will be detailed in the Final Environmental Impact Statement (FEIS) prepared for the USACE.

The TCEQ requests that the USACE utilize Option 1 (mechanical excavation) as outlined in the October 11, 2007, letter to complete these additions to the project.

In support of the national ambient air quality standards, the TCEQ also suggests the USACE adopt pollution prevention and/or reduction measures in conjunction with this and future projects, such as the following:

- encourage construction contractors to apply for Texas Emission Reduction Plan grants;
- establish bidding conditions that give preference to clean contractors;
- direct construction contractors to exercise air quality best management practices;

- direct contractors that will use tugboats during construction to use clean fuels;
- direct operators of the assist tugboats used in maneuvering dredge vessels to use clean fuels;
- select assist tugs based on lowest nitrogen oxide (NO_x) emissions instead of lowest price; and
- purchase and permanently retire surplus NO_x offsets prior to commencement of operations.

As requested in my earlier letter, I would appreciate receiving an update, as appropriate, as this project moves forward. I look forward to working with you in the future on any upcoming projects you may have that affect air quality in your district. If you require further assistance on this matter, please contact Koy Howard of my staff at (512)239-2306 or kohoward@tceq.state.tx.us

Sincerely,

Susana M. Hildebrand P.E., Director
Air Quality Division

cc: Ms. Carolyn Murphy, Chief, Environmental Section, USACE, Galveston District
Mr. Jeffrey Riley, Environmental Protection Agency (EPA) Region 6

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

January 2, 2008

Mr. Casey Cutler
Chief, Policy Analysis Section, Galveston District
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: Project schedule update for the Port Freeport widening project

Dear Mr. Cutler:

This letter provides reaffirmation of general conformity concurrence for the proposed Port Freeport channel-widening project. The information provided in the December 13, 2007, letter does not change the agency's position and the recommendations in the letter dated May 25, 2007, still apply. The Texas Commission on Environmental Quality (TCEQ) reviewed the project in accordance with Title 40 Code of Federal Regulations Part 93, and Title 30 Texas Administrative Code § 101.30 (30 TAC § 101.30) of the TCEQ general rules.

Thank you for providing the updates for our review. I look forward to working with you on future projects that may affect air quality in your district. If you require further assistance on this matter, please contact Mr. Theodore Kosub of my staff at (512) 239-5609 or tkosub@tceq.state.tx.us.

Sincerely,

Susana M. Hildebrand

Susana M. Hildebrand P.E., Director
Air Quality Division

SMH/TK/sy

cc: Jeff Riley, U.S. Environmental Protection Agency – Region 6
Ruben I. Velasquez, P.E., PBS&J

APPENDIX D

Summary of Estimated Air Emissions
600-ft Alternative

Appendix D - List of Tables
600-Ft Alternative
Port Freeport Channel Widening Project

Table D-1. Summary of Emissions by Engine Type and by Activity
600-Foot Alternative
Port Freeport Channel Widening Project

Engine Type - Activity	Emissions by Engine Type (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Propulsion - Dredging	19.66	149.42	3.40	3.59	25.02	2.13
Dredge Pumps - Dredging	3.97	40.23	0.91	0.96	6.63	0.35
Main Engine - Crane Dredging	0.12	1.19	0.03	0.03	0.20	0.01
Secondary - Dredging	10.42	90.34	2.05	2.16	14.98	1.11
Propulsion - Oceangoing	7.99	78.82	1.78	1.88	13.00	0.73
Secondary - Oceangoing	6.91	69.44	1.57	1.65	11.44	0.62
Vehicles	0.66	0.05	0.001	0.002	0.001	0.06
Construction	0.16	0.52	0.03	0.03	0.02	0.03
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**

Table D-2. Summary of Emissions from Propulsion Engines During Dredging Activities
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Propulsion Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	0.017	0.086	0.002	0.002	0.015	0.002
Runabout	0.017	0.086	0.002	0.002	0.015	0.002
Small Tug	0.124	0.648	0.015	0.016	0.112	0.016
Large Tug	0.248	1.296	0.030	0.032	0.223	0.031
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	0.012	0.062	0.001	0.002	0.011	0.001
Large Tug	0.419	4.248	0.096	0.101	0.699	0.037
Employee Vehicles	--	--	--	--	--	--
Hopper	9.065	91.969	2.074	2.188	15.144	0.807
Runabout	0.938	4.901	0.113	0.120	0.845	0.118
Shrimpboat	8.826	46.123	1.068	1.126	7.955	1.111
Employee Vehicles	--	--	--	--	--	--
Total from Propulsion Engine During Dredging	**19.66**	**149.42**	**3.40**	**3.59**	**25.02**	**2.13**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Propulsion Engines During Dredging	**39.4%**	**34.7%**	**34.8%**	**34.8%**	**35.1%**	**42.2%**

Table D-3. Summary of Emissions from Dredge Pumps During Dredging Activities
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Dredge Pumps (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.423	4.293	0.097	0.102	0.707	0.038
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	3.543	35.942	0.811	0.855	5.918	0.315
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Pump Engine During Dredging	**3.97**	**40.23**	**0.91**	**0.96**	**6.63**	**0.35**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Dredge Pumps During Dredging	**7.9%**	**9.4%**	**9.3%**	**9.3%**	**9.3%**	**7.0%**

Table D-4. Summary of Emissions from Main Crane Engine During Dredging Activities
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Main Crane Engine (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.118	1.195	0.027	0.028	0.197	0.010
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Crane Engine During Dredging	**0.12**	**1.19**	**0.03**	**0.03**	**0.20**	**0.01**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Main Crane Engine During Dredging	**0.2%**	**0.3%**	**0.3%**	**0.3%**	**0.3%**	**0.2%**

Table D-5. Summary of Emissions from Secondary and/or Auxiliary Engines During Dredging Activities
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Secondary Engines During Dredging (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.294	1.537	0.036	0.038	0.265	0.037
Anchor Tender	0.004	0.010	0.0003	0.0003	0.002	0.001
Runabout	0.006	0.016	0.0004	0.0004	0.003	0.001
Small Tug	0.011	0.031	0.001	0.001	0.006	0.002
Large Tug	0.011	0.031	0.001	0.001	0.006	0.002
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.048	0.252	0.006	0.006	0.044	0.006
Runabout	0.004	0.011	0.000	0.000	0.002	0.001
Large Tug	0.014	0.073	0.002	0.002	0.013	0.002
Employee Vehicles	--	--	--	--	--	--
Hopper	8.201	83.201	1.877	1.980	13.70	0.730
Runabout	0.064	0.180	0.004	0.005	0.033	0.011
Shrimpboat	1.765	4.995	0.123	0.130	0.912	0.314
Employee Vehicles	--	--	--	--	--	--
Total from Secondary Engine During Dredging	**10.42**	**90.34**	**2.05**	**2.16**	**14.98**	**1.11**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Secondary Engines During Dredging	**20.9%**	**21.0%**	**21.0%**	**21.0%**	**21.0%**	**21.9%**

Table D-6. Summary of Emissions from Propulsion Engines During Ocean-going Activities
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Propulsion Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	0.007	0.035	0.001	0.001	0.006	0.001
Runabout	0.000	0.000	0.000	0.000	0.000	0.000
Small Tug	0.124	0.648	0.015	0.016	0.112	0.016
Large Tug	0.248	1.296	0.030	0.032	0.223	0.031
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	0.002	0.009	0.0002	0.0002	0.001	0.0002
Large Tug	0.066	0.345	0.0080	0.0084	0.060	0.008
Employee Vehicles	--	--	--	--	--	--
Hopper	7.539	76.493	1.725	1.820	12.595	0.671
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Propulsion Engine During Ocean-going	**7.99**	**78.82**	**1.78**	**1.88**	**13.00**	**0.73**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Propulsion Engines During Ocean-going	**16.0%**	**18.3%**	**18.2%**	**18.2%**	**18.2%**	**14.4%**

Table D-7. Summary of Emissions from Secondary and/or Auxiliary Engines During Ocean-going Activities
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Secondary and/or Auxiliary Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.100	0.522	0.012	0.013	0.090	0.013
Anchor Tender	0.001	0.004	0.0001	0.0001	0.0000	0.0003
Runabout	0.000	0.000	0.000	0.000	0.000	0.000
Small Tug	0.011	0.031	0.001	0.001	0.006	0.002
Large Tug	0.011	0.031	0.001	0.001	0.006	0.002
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.007	0.035	0.0008	0.0009	0.006	0.001
Runabout	0.001	0.002	0.00004	0.00004	0.0003	0.0001
Large Tug	0.002	0.006	0.0002	0.0002	0.001	0.0004
Employee Vehicles	--	--	--	--	--	--
Hopper	6.782	68.804	1.552	1.637	11.329	0.604
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Secondary Engine During Ocean-going	**6.91**	**69.44**	**1.57**	**1.65**	**11.44**	**0.62**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Secondary Engines During Ocean-going	**13.9%**	**16.1%**	**16.0%**	**16.0%**	**16.0%**	**12.3%**

Table D-8. Summary of Emissions from Employee Vehicles
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Employee Vechicles (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	0.189	0.014	0.0003	0.0007	0.0002	0.018
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	0.030	0.002	0.00005	0.0001	0.00003	0.003
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	0.442	0.033	0.0007	0.0016	0.0005	0.042
Vehicles Total	**0.66**	**0.05**	**0.001**	**0.002**	**0.001**	**0.06**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Employee Vehicles	**1.3%**	**0.01%**	**0.01%**	**0.02%**	**0.001%**	**1.3%**

Table D-9. Summary of Emissions from Construction Equipment
600-Foot Alternative
Port Freeport Channel Widening Project

	Emissions from Nonroad Construction Equipment Engine (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	0.16	0.52	0.03	0.03	0.02	0.03
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Construction Total	**0.16**	**0.52**	**0.03**	**0.03**	**0.02**	**0.03**
Project Total	**49.89**	**430.02**	**9.76**	**10.30**	**71.28**	**5.04**
% of Project Total from Construction Equipment Engine	**0.3%**	**0.1%**	**0.3%**	**0.3%**	**0.0%**	**0.7%**

Table D-10. General Conformity Emissions Summary
600-Foot Alternative
Port Freeport Channel Widening Project

		Initial Evaluation		With Trench Option 1		With Trench Option 2		Additional Maintenance Dredging	
		Tons per Year		Tons per Year		Tons per Year		Tons per Year	
		NO_x	VOC	NO_x	VOC	NO_x	VOC	NO_x	VOC
		2008	2008	2008	2008	2008	2008	2008	2008
Marine Vessels - Dredging	Dredges	218.39	1.94	218.47	1.94	218.83	1.95	19.93	0.20
	Anchor Tender	0.097	0.003	0.10	0.003	0.10	0.003		
	Runabouts	5.26	0.135	5.26	0.135	5.26	0.135	0.48	0.012
	Tugs	6.33	0.09	6.55	0.09	6.36	0.091		
	Shrimpboat	51.12	1.43	51.12	1.43	51.14	1.43	2.39	0.07
	Subtotal	281.19	3.60	281.49	3.60	281.69	3.60	22.79	0.28
Marine Vessels - Oceangoing	Dredges	145.85	1.29	145.85	1.29	145.98	1.29	12.99	0.11
	Anchor Tender	0.039	0.001	0.04	0.001	0.04	0.001		
	Runabouts	0.01	0.0003	0.01	0.0003	0.01	0.0003		
	Tugs	2.36	0.06	2.36	0.06	2.36	0.06		
	Shrimpboat	--	--	--	--	--	--		
	Subtotal	148.26	1.35	148.26	1.35	148.39	1.35	12.99	0.11
Construction	Dozers	0.52	0.03	0.52	0.03	0.52	0.03		
	Clayball Removal			0.02	0.002	0.02	0.002		
	Subtotal	0.52	0.03	0.54	0.036	0.54	0.04		
Employee	Vehicles	0.05	0.06	0.05	0.06	0.05	0.06	0.03	0.04
	Total	**430.02**	**5.04**	**430.35**	**5.05**	**430.67**	**5.05**	**35.82**	**0.43**

Table D-A-1. Assumptions for Phase 1 Marine Equipment Engine HP, Load Factor, and Hours of Operation
600-Ft Alternative
Port Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	24" Cutterhead Discharge	1	4,000	Main Pump	Diesel	0.8	2,560	20	100%	12	240
				Secondary	Diesel	0.4	160	20	100%	12	240
				Auxiliary	Diesel	0.4	1,350	24	100%	12	288
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	750	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
	Crew/Survey Boat (Runabouts)	2	50	Propulsion	Diesel	0.4	50	20	100%	12	480
				Auxiliary	Diesel	0.2	17	20	100%	12	480
	Anchor Tender	1	100	Propulsion	Diesel	0.4	100	20	100%	12	240
				Auxiliary	Diesel	0.2	22	20	100%	12	240
	Towing Tug (Large)	1	1,500	Propulsion	Diesel	0.4	1,500	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
Mobilization / Demobilization	24" Cutterhead Discharge	1	4,000	Main Pump	Diesel	0.8	2,560		0%		0
				Secondary	Diesel	0.4	160	24	100%	4	96
				Auxiliary	Diesel	0.4	1,350	24	100%	4	96
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	750	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
	Crew/Survey Boat (Runabouts)	2	50	Propulsion	Diesel	0.4	50		0%		0
				Auxiliary	Diesel	0.2	17		0%		0
	Anchor Tender	1	100	Propulsion	Diesel	0.4	100	24	100%	4	96
				Auxiliary	Diesel	0.2	22	24	100%	4	96
	Towing Tug (Large)	1	1,500	Main Engine	Diesel	0.4	1,500	20	100%	12	240
				Auxiliary	Diesel	0.2	67	20	100%	12	240
Total Engine Hours in Phase 1											4,512
Total Engine Hours for all Phases											58,430
Percent of Total Engine Hours - Phase 1 Engine Hours											7.7%

Notes:
1. Hours of operation for Cutterhead dredge pump and cutter based on 20 hours/day and total phase duration of 12 days at rate of 25,000 CY per day.
2. Mobilization/Demobilization of pipeline using Large and Small Tug is assumed to be 12 days at a operating rate of 20 hrs/day. Mobilzation/Demobilzation of Cutterhead due to travel via interstate waterways into Houston-Galveston area is assumed to be 4 days total.
3. Cutterhead dredge is assumed to have a pontoon hull structure without propulsion. Dredge type and engine horsepower break-down is based on specifications for Ellicott's "Super-Dragon" Model Series 4170, available at www.dredge.com/specs/printer-friendly/4170.htm
4. Support equipment vessel (i.e. tugs, tenders, and crew boats) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table D-A-2. Assumptions for Phase 2 Marine Equipment Engine HP, Load Factor, and Hours of Operation
600-Ft Alternative
Port Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hrs/day)	Daily Engine Usage %	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	18	100%	19	342
				Auxiliary	Diesel	0.4	205	18	100%	19	342
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	18	100%	19	342
				Auxiliary	Diesel	0.2	17	18	100%	19	342
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.8	2,000	16	100%	19	304
				Auxiliary	Diesel	0.4	67	16	100%	19	304
Mobilization / Demobilization	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	0	0%	0	0
				Auxiliary	Diesel	0.4	205	24	100%	2	48
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	24	100%	2	48
				Auxiliary	Diesel	0.2	17	24	100%	2	48
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.4	2,000	24	100%	2	48
				Auxiliary	Diesel	0.2	67	24	100%	2	48
Total Engine Hours in Phase 2											2,216
Total Engine Hours for all Phases											58,430
Percent of Total Engine Hours - Phase 2 Engine Hours											3.8%

Notes:

1. Hours of operation for Bucket Crane dredge based on 18 hours/day and total phase duration of 19 days at rate of 8,000 CY per day.
2. Mobilization/Demobilization setup for all equipment assumed to be 48 hours.
3. The main engine of the bucket crane dredge is not a propulsion engine but is used to power the bucket during dredging. The auxillary engine for the bucket dredge was based on the minimum auxiliary horsepower cited in Starcrest's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005, page 156. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.
4. Support equipment vessel (i.e. tugs and crew boats) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table D-A-3. Assumptions for Phase 3 Marine Equipment Engine HP, Load Factor, and Hours of Operation
600-Ft Alternative
Port Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hr/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	Generic Large Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	267	2,421
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	267	3,026
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	267	3,026
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	267	2,848
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	267	3,560
	Crew/Survey Boat (Runabout)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	267	5,447
				Auxiliary	Diesel	0.2	17	20.4	100%	267	5,447
	Shrimp Boat	2	1,000	Propulsion	Diesel	0.4	1,000	24	100%	267	12,816
				Auxiliary	Diesel	0.2	200	24	100%	267	12,816
Mobilization / Demobilization	Generic Large Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	24	100%	4	96
				Auxillary - Oceangoing	Diesel	0.8	3,345	24	100%	4	96
Total Engine Hours in Phase 3											51,598
Total Engine Hours for all Phases											58,430
Percent of Total Engine Hours - Phase 3 Engine Hours											88.3%

Notes:

1. Total cycle time for Hopper Dredge is assumed to be 81 minutes and hopper dredge downtime is assumed to be 15%.
   Minute break-down of hopper dredge cycle is as follows:
   - Load time with dredge pumps on is 45 minutes.
   - Propulsion engine operate continously during entire cycle time of 81 minutes.
   - Bottom dumping without pumpout pumps takes 5 minutes.
   - Auxillary engines operate continuously, 24 hours per day.
2. Mobilization/Demobilization of Hopper due travel via interstate waterways into Houston-Galveston area is assumed to be 4 days total.
3. Hopper Dredge engine horsepower breakdown is based on specification for Great Lakes Dredge & Dock Company "Sugar Island Trailing Suction Hopper Dredge" with 3,600 yd^3 hopper capacity and total installed power of 9,395 hp. Specification is available at http://www.gldd.com/upload/zip/fleet/SUGAR_ISLAND_FLEET_SHEET.pdf.
4. Support equipment vessel (i.e. crew boat and shripm boat) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005.
   Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table D-A-4. Assumptions for Marine Equipment Engine HP, Load Factor, and Hours of Operation - Tranch Option 1
Trenching and Material Disposal for Routing Dredging Pipeline Across Jetty Channel
600-Ft Alternative
Port Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hrs/day)	Daily Engine Usage %	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	18	100%	1	18
				Auxiliary	Diesel	0.4	205	18	100%	1	18
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	18	100%	1	18
				Auxiliary	Diesel	0.2	17	18	100%	1	18
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.8	2,000	16	100%	1	16
				Auxiliary	Diesel	0.4	67	16	100%	1	16
Mobilization / Demobilization	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	0	0%	0	0
				Auxiliary	Diesel	0.4	205	0	100%	2	0
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	0	100%	2	0
				Auxiliary	Diesel	0.2	17	0	100%	2	0
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.4	2,000	0	100%	2	0
				Auxiliary	Diesel	0.2	67	0	100%	2	0
Total Engine Hours in Phase 2											104
Total Engine Hours for all Phases											56,318
Percent of Total Engine Hours - Phase 2 Engine Hours											0.2%

Notes:
1. Hours of operation for Bucket Crane dredge based on trench volume of 10,000 by and an operating rate of 8,000 CY per day and placement of material on offshore placement area.
2. Mobilization/Demobilization setup for all equipment assumed to be 48 hours.
3. The main engine of the bucket crane dredge is not a propulsion engine but is used to power the bucket during dredging. The auxillary engine for the bucket dredge was based on the minimum auxiliary horsepower cited in Starcrest's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005, page 156. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.
4. Support equipment vessel (i.e. tugs and crew boats) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table D-A-5. Assumptions for Marine Equipment Engine HP, Load Factor, and Hours of Operation - Trench Option 2
Trenching and Material Disposal for Routing Dredging Pipeline Across Jetty Channel
600-Ft Alternative
Port Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per Day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Pipeline Dredging (Phase 1)	24" Cutterhead	1	4,000	Main Power	Diesel	0.8	2,560	20	100%	0.5	10
				Secondary	Diesel	0.4	160	20	100%	0.5	10
				Auxiliary	Diesel	0.4	750	24	100%	0.5	12
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	67	20	100%	0.5	10
				Auxiliary	Diesel	0.2	67	20	100%	0.5	10
	Crew/Survey Boat (Runabouts)	1	50	Propulsion	Diesel	0.4	50	20	100%	0.5	10
				Auxiliary	Diesel	0.2	17	20	100%	0.5	10
Hopper Dredging (Phase 2)	Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	0.25	2
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	0.25	3
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	0.25	3
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	0.25	3
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	0.25	3
	Runabout (Large)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	0.25	5
				Auxiliary	Diesel	0.2	17	20.4	100%	0.25	5
	Shrimp Boat (Turtle Trawl)	1	1,000	Propulsion	Diesel	0.4	1,000	24	100%	0.25	6
				Auxiliary	Diesel	0.2	200	24	100%	0.25	6
Total Engine Hours											108

Notes:
1. Days of operation are determined assuming 25,000 CY/day production rate for the cutterhead dredge and 40,000 CY/day production rate for the hopper dredge.
2. Estimate based on placement of dredged material into Reach 1 or 2 with cutterhead dredge and then to offshore placement area with hopper dredge.

Table D-A-6. Assumptions for Marine Equipment Engine HP, Load Factor, and Hours of Operation - Additional Maintenance Dredging
Additional 984,000 cy/yr Maintenance Dredging
600-Ft Alternative
Port Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per Day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Additional Maintenance Dredging	Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	25	224
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	25	286
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	25	286
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	25	264
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	25	336
	Runabout (Large)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	25	510
				Auxiliary	Diesel	0.2	17	20.4	100%	25	510
	Shrimp Boat (Turtle Trawl)	2	1,000	Propulsion	Diesel	0.4	1,000	24	100%	25	600
				Auxiliary	Diesel	0.2	200	24	100%	25	600
Total Engine Hours											3,616

Notes:
1. Days of operation are determined assuming 40,000 CY/day production rate for a hopper dredge removing unconsolidated, predominantly silty dredged material.

Table D-A-7. Marine Engine Emission Factors and Fuel Consumption Algorithms
(in g/kW-hr, for all marine engines)

Statistical Parameter	Exponent (x)	Intercept (b)	Coefficient (a)
CO	1	0	0.8378
NO_X	1.5	10.4496	0.1255
PM	1.5	0.2551	0.0059
PM2.5	1.5	0.2551	0.0059
PM10	1.5	0.2551	0.0059
SO_X	n/a	0	2.3735
VOC (HC)	1.5	0	0.0667

Notes:

1.) All regressions but SO_2 are in the form of:

Emissions Rate (g/hp-hr) = (a*(Fractional Load)$^{-x}$ + b) * 0.7457
where the conversion factor of 0.7457 kW/hp is used to calculate the emission factor in g/hp-hr

2.) Fractional Load is equal to actual engine output divided by rated engine output.

3.) The SO_2 regression is the form of:

Emissions Rate (g/hp-hr) = a*(Fuel Sulfur Flow in g/hp-hr) + b
where Fuel Sulfur Flow is the Fuel Consumption times the sulfur content of the fuel;
The sulfur content for the fuel consumption regression was set to 3300 parts per million (0.33 wt%)

4.) **Fuel Consumption (g/hp-hr) = (14.12 / (Fractional Load) + 205.717) * 0.7457**

5.) n/a is not applicable, n/s is not statistically significant.

6.) All information shown above is detailed in Table 5-1 of the EPA technical report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", EPA 420-R-00-002, February 2000.

Table D-B-1. Phase 1 Marine Equipment Emission Factors and Emission Rates - Cutterhead
Port Freeport Channel Widening Project

	Dredge											Mob/Demob										
	24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)	
	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Pump	Seconday	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary
hp	2,560	160	1,350	750	67	50	17	100	22	1,500	67	2,560	160	1,350	750	67	50	17	100	22	1,500	67
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.4	0.4	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.8	0.4	0.4	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2
Age Factor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)																						
CO	0.780934	1.561869	1.561869	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	0.780934	1.561869	1.561869	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737
NO_X	7.923056	8.162195	8.162195	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	7.923056	8.162195	8.162195	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583
PM	0.196377	0.207619	0.207619	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.196377	0.207619	0.207619	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417
PM2.5	0.178703	0.188933	0.188933	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.178703	0.188933	0.188933	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870
PM10	0.188522	0.199314	0.199314	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.188522	0.199314	0.199314	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841
SO_X	1.304627	1.407716	1.407716	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.304627	1.407716	1.407716	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894
VOC (HC)	0.069511	0.196607	0.196607	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.069511	0.196607	0.196607	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090
Emission Rate (tons/hr)																						
CO	0.001763	0.000110	0.000930	0.000516	0.000046	0.000034	0.000012	0.000069	0.000015	0.001033	0.000046	0.001763	0.000110	0.000930	0.000516	0.000046	0.000034	0.000012	0.000069	0.000015	0.001033	0.000046
NO_X	0.017886	0.000576	0.004858	0.002699	0.000131	0.000180	0.000033	0.000360	0.000043	0.005398	0.000131	0.017886	0.000576	0.004858	0.002699	0.000131	0.000180	0.000033	0.000360	0.000043	0.005398	0.000131
PM	0.000443	0.000015	0.000124	0.000069	0.000004	0.000005	0.000001	0.000009	0.000001	0.000137	0.000004	0.000443	0.000015	0.000124	0.000069	0.000004	0.000005	0.000001	0.000009	0.000001	0.000137	0.000004
PM2.5	0.000403	0.000013	0.000112	0.000062	0.000003	0.000004	0.000001	0.000008	0.000001	0.000125	0.000003	0.000403	0.000013	0.000112	0.000062	0.000003	0.000004	0.000001	0.000008	0.000001	0.000125	0.000003
PM10	0.000426	0.000014	0.000119	0.000066	0.000003	0.000004	0.000001	0.000009	0.000001	0.000132	0.000003	0.000426	0.000014	0.000119	0.000066	0.000003	0.000004	0.000001	0.000009	0.000001	0.000132	0.000003
SO_X	0.002945	0.000099	0.000838	0.000466	0.000024	0.000031	0.000006	0.000062	0.000008	0.000931	0.000024	0.002945	0.000099	0.000838	0.000466	0.000024	0.000031	0.000006	0.000062	0.000008	0.000931	0.000024
VOC (HC)	0.000157	0.000014	0.000117	0.000065	0.000008	0.000004	0.000002	0.000009	0.000003	0.000130	0.000008	0.000157	0.000014	0.000117	0.000065	0.000008	0.000004	0.000002	0.000009	0.000003	0.000130	0.000008

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.
A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.
The following assumptions applied to the load factor determination during dredging operations:
A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.
B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.
C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).
D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.
E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.
The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:
A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.
B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.
C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.
D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.
E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table D-B-2. Phase 2 Marine Equipment Emission Factors and Emission Rates - Bucket Crane
Port Freeport Channel Widening Project

	Dredge						Mob/Demob Setup					
	Bucket Crane		Crew/Survey Vessel (Runabout)		Towing Vessel (Large Tug)		Bucket Crane		Crew/Survey Vessel (Runabout)		Towing Vessel (Large Tug)	
	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary
hp	500	205	50	17	2,000	67	500	205	50	17	2,000	67
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.4	0.4	0.2	0.8	0.4	0.8	0.4	0.4	0.2	0.4	0.2
Age Factor	-	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)												
CO	0.780934	1.561869	1.561869	3.123737	0.780934	1.561869	0.780934	1.561869	1.561869	3.123737	1.561869	3.123737
NO_X	7.923056	8.162195	8.162195	8.838583	7.923056	8.162195	7.923056	8.162195	8.162195	8.838583	8.162195	8.838583
PM	0.196377	0.207619	0.207619	0.239417	0.196377	0.207619	0.196377	0.207619	0.207619	0.239417	0.207619	0.239417
PM2.5	0.178703	0.188933	0.188933	0.217870	0.178703	0.188933	0.178703	0.188933	0.188933	0.217870	0.188933	0.217870
PM10	0.188522	0.199314	0.199314	0.229841	0.188522	0.199314	0.188522	0.199314	0.199314	0.229841	0.199314	0.229841
SO_X	1.304627	1.407716	1.407716	1.613894	1.304627	1.407716	1.304627	1.407716	1.407716	1.613894	1.407716	1.613894
VOC (HC)	0.069511	0.196607	0.196607	0.556090	0.069511	0.196607	0.069511	0.196607	0.196607	0.556090	0.196607	0.556090
Emission Rate (tons/hr)												
CO	0.000344	0.000141	0.000034	0.000012	0.001377	0.000046	0.000344	0.000141	0.000034	0.000012	0.001377	0.000046
NO_X	0.003493	0.000738	0.000180	0.000033	0.013974	0.000241	0.003493	0.000738	0.000180	0.000033	0.007198	0.000131
PM	0.000087	0.000019	0.000005	0.000001	0.000346	0.000006	0.000087	0.000019	0.000005	0.000001	0.000183	0.000004
PM2.5	0.000079	0.000017	0.000004	0.000001	0.000315	0.000006	0.000079	0.000017	0.000004	0.000001	0.000167	0.000003
PM10	0.000083	0.000018	0.000004	0.000001	0.000332	0.000006	0.000083	0.000018	0.000004	0.000001	0.000176	0.000003
SO_X	0.000575	0.000127	0.000031	0.000006	0.002301	0.000042	0.000575	0.000127	0.000031	0.000006	0.001241	0.000024
VOC (HC)	0.000031	0.000018	0.000004	0.000002	0.000123	0.000006	0.000031	0.000018	0.000004	0.000002	0.000173	0.000008

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.

A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.

The following assumptions applied to the load factor determination during dredging operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).

D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.

D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table D-B-3. Phase 3 Marine Equipment Emission Factors and Emission Rates - Hopper
Port Freeport Channel Widening Project

	Dredge									Mob/Demob Towing	
	Generic Large Hopper Dredge					Crew/Survey Boat (Runabout)		Shrimp Boat		Generic Large Hopper Dredge	
•	Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxiliary - Dredging	Propulsion	Secondary	Propulsion	Secondary	Propulsion - Oceangoing	Auxiliary - Oceangoing
hp	4,350	4,350	1,700	3,345	3,345	250	17	1,000	200	4,350	3,345
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.8	0.8	0.8	0.8	0.4	0.2	0.4	0.2	0.8	0.8
Age Factor	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)											
CO	0.780934	0.780934	0.780934	0.780934	0.780934	1.561869	3.123737	1.561869	3.123737	0.780934	0.780934
NO_X	7.923056	7.923056	7.923056	7.923056	7.923056	8.162195	8.838583	8.162195	8.838583	7.923056	7.923056
PM	0.196377	0.196377	0.196377	0.196377	0.196377	0.207619	0.239417	0.207619	0.239417	0.196377	0.196377
PM2.5	0.178703	0.178703	0.178703	0.178703	0.178703	0.188933	0.217870	0.188933	0.217870	0.178703	0.178703
PM10	0.188522	0.188522	0.188522	0.188522	0.188522	0.199314	0.229841	0.199314	0.229841	0.188522	0.188522
SO_X	1.304627	1.304627	1.304627	1.304627	1.304627	1.407716	1.613894	1.407716	1.613894	1.304627	1.304627
VOC (HC)	0.069511	0.069511	0.069511	0.069511	0.069511	0.196607	0.556090	0.196607	0.556090	0.069511	0.069511
Emission Rate (tons/hr)											
CO	0.002996	0.002996	0.001171	0.002304	0.002304	0.000172	0.000012	0.000689	0.000138	0.002996	0.002304
NO_X	0.030393	0.030393	0.011878	0.023371	0.023371	0.000900	0.000033	0.003599	0.000390	0.030393	0.023371
PM	0.000753	0.000753	0.000294	0.000579	0.000579	0.000023	0.000001	0.000092	0.000011	0.000753	0.000579
PM2.5	0.000686	0.000686	0.000268	0.000527	0.000527	0.000021	0.000001	0.000083	0.000010	0.000686	0.000527
PM10	0.000723	0.000723	0.000283	0.000556	0.000556	0.000022	0.000001	0.000088	0.000010	0.000723	0.000556
SO_X	0.005005	0.005005	0.001956	0.003848	0.003848	0.000155	0.000006	0.000621	0.000071	0.005005	0.003848
VOC (HC)	0.000267	0.000267	0.000104	0.000205	0.000205	0.000022	0.000002	0.000087	0.000025	0.000267	0.000205

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.

A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.

The following assumptions applied to the load factor determination during dredging operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).

D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.

D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table D-C-1. Phase 1 Marine Equipment Hours of Operation
600-Foot Alternative
Port Freeport Channel Widening Project

			Dredge											Mobilization / Demobilization											
			24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (2 Runabouts)		Anchor Tender		Towing Tug (Large)	
Contract No.	Location/Disposal Site	Dredge	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary
1	300,000 CY of Silty Sand (placed on beach)	Hydraulic	240	240	288	240	240	480	480	240	240	240	240	0	96	96	240	240	0	0	96	96	240	240

Table D-C-2. Phase 2 Marine Equipment Hours of Operation
600-Foot Alternative
Port Freeport Channel Widening Project

			Dredge						Mobilization / Demobilization					
			Bucket Crane		Crew/Survey Vessel		Towing Vessel (Large		Bucket Crane		Crew/Survey Vessel		Towing Vessel (Large Tug)	
Contract No.	Location/Disposal Site	Dredge	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary	Propulsion	Secondary	Propulsion	Secondary
2	150,000 CY of Clay (placed in ODMDS	Bucket Crane	342	342	342	342	304	304	0	48	48	48	48	48

Table D-C-3. Phase 3 Marine Equipment Hours of Operation
600-Foot Alternative
Port Freeport Channel Widening Project

			Dredge										Mobilization / Demobilization	
			Generic Large Hopper Dredge						Crew/Survey Boat (Runabout)		Shrimp Boats (Total of Two)		Generic Large Hopper Dredge	
Contract No.	Location/Disposal Site	Dredge	Propulsion Ocean Going	Propulsion Dredging	Dredge Pump(s)	Pumpout Pump(s)	Auxillary Oceangoing	Auxiliary Dredging	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Auxillary & Misc.
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	2,421	3,026	3,026	0	2,848	3,560	5,447	5,447	12,816	12,816	96	96

Table D-C-4. Trench Option 1 - Marine Equipment Hours of Operation
600-Foot Alternative
Port Freeport Channel Widening Project

		Dredge						Mobilization / Demobilization					
		Bucket Crane		Crew/Survey Vessel		Towing Vessel (Large		Bucket Crane		Crew/Survey Vessel		Towing Vessel (Large	
Location/Disposal Site	Dredge	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary	Propulsion	Secondary	Propulsion	Secondary
8,000 CY of Material (placed in ODMDS	Bucket Crane	18	18	18	18	16	16	0	0	0	0	0	0

Table D-C-5. Trench Option 2 - Marine Equipment Hours of Operation
600-Foot Alternative
Port Freeport Channel Widening Project

			Dredge											Mobilization / Demobilization										
			24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (2 Runabouts)		Anchor Tender		Towing Tug (Large)	
Contract No.	Location/Disposal Site	Dredge	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary
Trench Option 2 - Phase 1	12,500 CY of Silty Sand/Clay (placed for pickup)	Hydraulic	10	10	12	10	10	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

			Dredge										Mobilization / Demobilization	
			Generic Large Hopper Dredge						Crew/Survey Boat (Runabout)		Shrimp Boats (Total of Two)		Generic Large Hopper Dredge	
Contract No.	Location/Disposal Site	Dredge	Propulsion Ocean Going	Propulsion Dredging	Dredge Pump(s)	Pumpout Pump(s)	Auxiliary Oceangoing	Auxiliary Dredging	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Auxiliary & Misc.
Trench Option 2 - Phase 2	2,750,000 CY of Clay (placed in OCMDS)	Hopper	2	3	3	0	3	3	5	5	6	6	0	0

Table D-C-6. Marine Equipment Hours of Operation - Additional Maintenance Dredging
600-Foot Alternative
Port Freeport Channel Widening Project

			Dredge										Mobilization / Demobilization	
			Generic Large Hopper Dredge						Crew/Survey Boat (Runabout)		Shrimp Boats (Total of Two)		Generic Large Hopper Dredge	
Contract No.	Location/Disposal Site	Dredge	Propulsion Ocean Going	Propulsion Dredging	Dredge Pump(s)	Pumpout Pump(s)	Auxiliary Oceangoing	Auxiliary Dredging	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Auxiliary & Misc.
3	984,000 CY of Clay (placed in ODMDS)	Hopper	224	286	286	0	264	336	510	510	600	600	0	0

Table D-D-1. Marine Equipment Estimated Emissions for Phase 1 - Cutterhead
600-Ft Alternative
Port Freeport Channel Widening
(tons per year)

Phase No.	Pollutant	Dredge	Dredge										Mobilization / Demobilization										Total Phase Emissions
			24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat		Anchor Tender		Towing Tug (Large)		
			Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	
1	CO	Hydraulic	0.4231	0.0264	0.2678	0.1240	0.0111	0.0165	0.0056	0.0165	0.0036	0.2479	0.0111	0.0000	0.0106	0.0893	0.1240	0.0111	0.0000	0.0000	0.0066	0.0015	0.2479	0.0111	1.66
1	NOX	Hydraulic	4.2927	0.1382	1.3992	0.6478	0.0313	0.0864	0.0159	0.0864	0.0103	1.2956	0.0313	0.0000	0.0553	0.4664	0.6478	0.0313	0.0000	0.0000	0.0345	0.0041	1.2956	0.0313	10.60
1	PM2.5	Hydraulic	0.0988	0.0032	0.0324	0.0150	0.0008	0.0020	0.0004	0.0020	0.0003	0.0300	0.0008	0.0000	0.0013	0.0108	0.0150	0.0008	0.0000	0.0000	0.0008	0.0001	0.0300	0.0008	0.24
1	PM10	Hydraulic	0.1021	0.0034	0.0342	0.0158	0.0008	0.0021	0.0004	0.0021	0.0003	0.0316	0.0008	0.0000	0.0013	0.0114	0.0158	0.0008	0.0000	0.0000	0.0008	0.0001	0.0316	0.0008	0.26
1	SOX	Hydraulic	0.7089	0.0238	0.2413	0.1117	0.0057	0.0149	0.0029	0.0149	0.0019	0.2234	0.0057	0.0000	0.0095	0.0804	0.1117	0.0057	0.0000	0.0000	0.0060	0.0008	0.2234	0.0057	1.80
1	VOC	Hydraulic	0.0377	0.0033	0.0337	0.0156	0.0020	0.0021	0.0010	0.0021	0.0006	0.0312	0.0020	0.0000	0.0013	0.0112	0.0156	0.0020	0.0000	0.0000	0.0008	0.0003	0.0312	0.0020	0.20

Table D-D-2. Marine Equipment Estimated Emissions for Phase 2 - Bucket Crane
600-Ft Alternative
Port Freeport Channel Widening
(tons per year)

			Dredge						Mobilization / Demobilization						Total Phase Emissions
			Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		
Phase No.	Pollutant	Dredge	Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	
2	CO	Bucket Crane	0.1178	0.0483	0.0118	0.0040	0.4187	0.0140	0.0000	0.0068	0.0017	0.0006	0.0661	0.0022	0.69
2	NOX	Bucket Crane	1.1948	0.2523	0.0615	0.0113	4.2480	0.0733	0.0000	0.0354	0.0086	0.0016	0.3455	0.0063	6.24
2	PM2.5	Bucket Crane	0.0269	0.0058	0.0014	0.0003	0.0958	0.0017	0.0000	0.0008	0.0002	0.0000	0.0080	0.0002	0.14
2	PM10	Bucket Crane	0.0284	0.0062	0.0015	0.0003	0.1011	0.0018	0.0000	0.0009	0.0002	0.0000	0.0084	0.0002	0.15
2	SOX	Bucket Crane	0.1967	0.0435	0.0106	0.0021	0.6995	0.0126	0.0000	0.0061	0.0015	0.0003	0.0596	0.0011	1.03
2	VOC	Bucket Crane	0.0105	0.0061	0.0015	0.0007	0.0373	0.0018	0.0000	0.0009	0.0002	0.0001	0.0083	0.0004	0.07

Table D-D-3. Marine Equipment Estimated Emissions for Phase 3 - Hopper
600-Ft Alternative
Port Freeport Channel Widening
(tons per year)

Phase No.	Pollutant	Dredge	Dredge									Mobilization / Demobilization		Total Phase Emissions
			Generic Large Hopper Dredge					Crew/Survey Boat		Shrimp Boat		Generic Large Hopper		
			Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxillary - Dredging	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion - Oceangoing	Auxiliary - Oceangoing	
3	CO	Hopper	7.2519	9.0649	3.5426	6.5606	8.2007	0.9377	0.0638	8.8259	1.7652	0.2876	0.2211	46.72
3	NOX	Hopper	73.5751	91.9688	35.9418	66.5608	83.2010	4.9006	0.1804	46.1232	4.9945	2.9177	2.2436	412.61
3	PM2.5	Hopper	1.6595	2.0743	0.8107	1.5013	1.8766	0.1134	0.0044	1.0676	0.1231	0.0658	0.0506	9.35
3	PM10	Hopper	1.7506	2.1883	0.8552	1.5838	1.9797	0.1197	0.0047	1.1263	0.1299	0.0694	0.0534	9.86
3	SOX	Hopper	12.1150	15.1438	5.9183	10.9600	13.7001	0.8452	0.0329	7.9548	0.9120	0.4804	0.3694	68.43
3	VOC	Hopper	0.6455	0.8069	0.3153	0.5840	0.7299	0.1180	0.0114	1.1110	0.3142	0.0256	0.0197	4.68

Table D-D-4. Marine Equipment Estimated Emissions for Trench Construction - Option 1
600-Ft Alternative
Port Freeport Channel Widening
(tons per year)

Trench Option	Pollutant	Dredge	Dredge						Mobilization / Demobilization						Total Phase Emissions
			Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		
			Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	
1	CO	Bucket Crane	0.0062	0.0025	0.0006	0.0002	0.0220	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.03
1	NOX	Bucket Crane	0.0629	0.0133	0.0032	0.0006	0.2236	0.0039	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.31
1	PM2.5	Bucket Crane	0.0014	0.0003	0.0001	0.0000	0.0050	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.01
1	PM10	Bucket Crane	0.0015	0.0003	0.0001	0.0000	0.0053	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.01
1	SOX	Bucket Crane	0.0104	0.0023	0.0006	0.0001	0.0368	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.05
1	VOC	Bucket Crane	0.0006	0.0003	0.0001	0.0000	0.0020	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.003

Table D-D-5. Marine Equipment Estimated Emissions for Trench Construction - Option 2
600-Ft Alternative
Port Freeport Channel Widening
(tons per year)

Trench Option	Pollutant	Dredge	Dredge										Mobilization / Demobilization										Total Phase Emissions
			24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat		Anchor Tender		Towing Tug (Large)		
			Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	
Trench Option 2 - Phase 1	CO	Hydraulic	0.0176	0.0011	0.0112	0.0052	0.0005	0.0003	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.04
Trench Option 2 - Phase 1	NOX	Hydraulic	0.1789	0.0058	0.0583	0.0270	0.0013	0.0018	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.27
Trench Option 2 - Phase 1	PM2.5	Hydraulic	0.0040	0.0001	0.0013	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.01
Trench Option 2 - Phase 1	PM10	Hydraulic	0.0043	0.0001	0.0014	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.01
Trench Option 2 - Phase 1	SOX	Hydraulic	0.0295	0.0010	0.0101	0.0047	0.0002	0.0003	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.05
Trench Option 2 - Phase 1	VOC	Hydraulic	0.0018	0.0001	0.0014	0.0007	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00

Trench Option	Pollutant	Dredge	Dredge								Mobilization / Demobilization		Total Phase Emissions
			Generic Large Hopper Dredge					Crew/Survey Boat		Shrimp Boat		Generic Large Hopper	
			Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxiliary - Dredging	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion - Oceangoing	Auxiliary - Oceangoing	
Trench Option 2 - Phase 2	CO	Hopper	0.0067	0.0068	0.0033	0.0061	0.0077	0.0009	0.0001	0.0041	0.0008	0.0000	0.0000	0.04
Trench Option 2 - Phase 2	NOX	Hopper	0.0682	0.0688	0.0339	0.0617	0.0765	0.0046	0.0002	0.0218	0.0023	0.0000	0.0000	0.36
Trench Option 2 - Phase 2	PM2.5	Hopper	0.0015	0.0020	0.0008	0.0014	0.0018	0.0001	0.0000	0.0005	0.0001	0.0000	0.0000	0.01
Trench Option 2 - Phase 2	PM10	Hopper	0.0016	0.0021	0.0008	0.0015	0.0019	0.0001	0.0000	0.0005	0.0001	0.0000	0.0000	0.01
Trench Option 2 - Phase 2	SOX	Hopper	0.0112	0.0143	0.0056	0.0102	0.0129	0.0008	0.0000	0.0037	0.0004	0.0000	0.0000	0.06
Trench Option 2 - Phase 2	VOC	Hopper	0.0006	0.0008	0.0003	0.0005	0.0007	0.0001	0.0000	0.0005	0.0001	0.0000	0.0000	0.004

Table D-D-6. Marine Equipment Estimated Emissions for Additional Maintenance Dredging
600-Foot Alternative
Port Freeport Channel Widening
(tons per year)

Phase No.	Pollutant	Dredge	Dredge									Mobilization / Demobilization		Total Phase Emissions
			Generic Large Hopper Dredge					Crew/Survey Boat		Shrimp Boat		Generic Large Hopper		
			Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxillary - Dredging	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion - Oceangoing	Auxiliary - Oceangoing	
3	CO	Hopper	0.6722	0.8556	0.3344	0.6081	0.7740	0.0878	0.0060	0.4132	0.0826	0.0000	0.0000	3.83
3	NOX	Hopper	6.8202	8.6802	3.3923	6.1700	7.8527	0.4589	0.0169	2.1593	0.2338	0.0000	0.0000	35.78
3	PM2.5	Hopper	0.1538	0.1958	0.0765	0.1392	0.1771	0.0106	0.0004	0.0500	0.0058	0.0000	0.0000	0.81
3	PM10	Hopper	0.1623	0.2065	0.0807	0.1468	0.1868	0.0112	0.0004	0.0527	0.0061	0.0000	0.0000	0.85
3	SOX	Hopper	1.1230	1.4293	0.5586	1.0160	1.2930	0.0791	0.0031	0.3724	0.0427	0.0000	0.0000	5.92
3	VOC	Hopper	0.0598	0.0762	0.0298	0.0541	0.0689	0.0111	0.0011	0.0520	0.0147	0.0000	0.0000	0.37

Table D-D-7. Total Emissions from Marine Equipment - Comparison of Initial Evaluation to Additional Work Options
600- Ft Alternative
Freeport Channel Widening Project
(tons per year)

Initial Evaluation - 600-Foot Alternative

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1	300,000 CY of Silty Sand (placed on beach)	Cutterhead	1.66	10.60	0.24	0.26	1.80	0.20
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	0.69	6.24	0.14	0.15	1.03	0.07
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	46.72	412.61	9.35	9.86	68.43	4.68
		TOTAL	**49.07**	**429.45**	**9.73**	**10.27**	**71.26**	**4.94**

Addition of Pipeline Trench - Option 1 (Mechanical Excavation)

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1	300,000 CY of Silty Sand (placed on beach)	Cutterhead	1.66	10.60	0.24	0.26	1.80	0.20
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	0.69	6.24	0.14	0.15	1.03	0.07
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	46.72	412.61	9.35	9.86	68.43	4.68
Trench - Option 1	8,000 CY of Material (placed in ODMDS)	Bucket Crane	0.03	0.31	0.01	0.01	0.05	0.003
		TOTAL	**49.10**	**429.76**	**9.74**	**10.27**	**71.31**	**4.95**
	Increase in Emissions from Initial Evaluation		0.03	0.31	0.01	0.01	0.05	0.003
	% Increase in Emissions from Initial Evaluation		**0.07%**	**0.07%**	**0.07%**	**0.07%**	**0.07%**	**0.06%**

Addition of Pipeline Trench - Option 2 (Hydraulic Excavation)

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1	300,000 CY of Silty Sand (placed on beach)	Cutterhead	1.66	10.60	0.24	0.26	1.80	0.20
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	0.69	6.24	0.14	0.15	1.03	0.07
3	2,750,000 CY of Clay (placed in ODMDS)	Hopper	46.72	412.61	9.35	9.86	68.43	4.68
Trench - Option 2	12,500 CY of Silty Sand/Clay (placed for pickup)*	Hydraulic	0.036	0.27	0.006	0.0066	0.046	0.004
	10,000 CY of Silty Sand/Clay (placed in ODMDS)	Hopper	0.038	0.36	0.008	0.009	0.059	0.004
		TOTAL	**49.14**	**430.08**	**9.75**	**10.28**	**71.37**	**4.95**
	Increase in Emissions from Initial Evaluation		0.07	0.63	0.014	0.015	0.105	0.008
	% Increase in Emissions from Initial Evaluation		**0.15%**	**0.15%**	**0.15%**	**0.15%**	**0.15%**	**0.15%**

* Actual volume is not expected to exceed 10,000 cubic yards.

Additional Maintenance Dredging - 600-Foot Alternative

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
Additional Maintenance	984,000 CY of Silty Dredged Material (placed in ODMDS)	Hopper	3.83	35.78	0.81	0.85	5.92	0.37
		TOTAL	**3.83**	**35.78**	**0.81**	**0.85**	**5.92**	**0.37**
	% Increase in Emissions from Initial Evaluation of 600-ft Alternative		**7.8%**	**8.3%**	**8.3%**	**8.3%**	**8.3%**	**7.4%**

Additional Maintenance Dredging - 500-Foot Alternative

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
Additional Maintenance	480,000 CY of Silty Dredged Material (placed in ODMDS)	Hopper	1.84	17.18	0.39	0.41	2.84	0.18
		TOTAL	**1.84**	**17.18**	**0.39**	**0.41**	**2.84**	**0.18**
	% Increase in Emissions from Initial Evaluation of 500-ft Alternative		**7.3%**	**7.7%**	**7.7%**	**7.7%**	**7.7%**	**7.0%**

Table D-E-1. Dozer/Dump Truck Engine Emission Factors from NONROAD Model
(2007 Model Year)
Port Freeport Channel Widening Project

Range	HP	SCC	EQUIP	CLASSIFICATION	Engine Type	Fuel Type	VOC exhaust g/HP-hr	PM10 exhaust g/HP-hr	PM25 exhaust g/HP-hr	VOCCrank case g/HP-hr	CO exhaust g/HP-hr	NOx exhaust g/HP-hr	SO2 exhaust g/HP-hr
25 < HP <= 40	40	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0	0	0	0	0	0	0
40 < HP <= 50	50	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0	0	0	0	0	0	0
50 < HP <= 75	75	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.550892	0.57439	0.557158	0.0110178	3.99342	5.116764	0.182161
75 < HP <= 100	100	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.550892	0.57439	0.557158	0.0110178	3.993421	5.116764	0.182161
100 < HP <= 175	175	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.376348	0.330764	0.320841	0.007527	1.571124	4.683537	0.164147
175 < HP <= 300	300	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.327746	0.275964	0.267685	0.0065549	1.324665	4.443677	0.164193
300 < HP <= 600	600	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.287969	0.27549	0.267225	0.0057594	2.132524	5.081266	0.164231
600 < HP <= 750	750	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.263142	0.291857	0.283101	0.0052628	2.522371	5.073179	0.164254
750 < HP <= 1000	1000	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.479153	0.362522	0.351646	0.0095831	2.557593	6.503246	0.164049
1000 < HP <= 1200	1200	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.479153	0.362522	0.351646	0.0095831	2.557593	6.503246	0.164049
1200 < HP <= 2000	2000	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.479153	0.362522	0.351646	0.0095831	2.557593	6.503246	0.164049

Range	HP	SCC	EQUIP	CLASSIFICATION	Engine Type	Fuel Type	VOC exhaust g/HP-hr	PM10 exhaust g/HP-hr	PM25 exhaust g/HP-hr	VOCCrank case g/HP-hr	CO exhaust g/HP-hr	NOx exhaust g/HP-hr	SO2 exhaust g/HP-hr
100 < HP <= 175	175	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.345923	0.299023	0.290052	0.0069185	1.417861	4.054775	0.164176
175 < HP <= 300	300	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.295608	0.235585	0.228517	0.0059122	1.219344	3.780532	0.164223
300 < HP <= 600	600	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.200581	0.211006	0.204676	0.0040116	1.603044	4.200997	0.164314
600 < HP <= 750	750	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.182463	0.229006	0.222136	0.0036493	2.190442	4.235714	0.164331
750 < HP <= 1000	1000	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.337277	0.256852	0.249146	0.0067455	1.564913	5.731179	0.164184
1000 < HP <= 1200	1200	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.337277	0.256852	0.249146	0.0067455	1.564913	5.731177	0.164184
1200 < HP <= 2000	2000	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.337277	0.256852	0.249146	0.0067455	1.564913	5.731177	0.164184
2000 < HP <= 3000	3000	2270002051	Off-highway Trucks	Construction and Mining Equipment	Diesel	Diesel	0.337277	0.256852	0.249146	0.0067455	1.564913	5.731178	0.164184

Note:
1. Emission factors generated from EPA NONROAD 2005 model run for bulldozers in Brazoria County for the model year 2007.

Table D-E-2. Phase 1 NONROAD Emissions - Dredge Support
600-Foot Alternative
Port Freeport Channel Widening Project

CO

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	1.32	0.093	0.004
Dozer	200	0.59	1	15	360	24.00	1.32	0.062	0.003
							Contract Total	**0.155**	**0.006**

NO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	4.44	0.312	0.013
Dozer	200	0.59	1	15	360	24.00	4.44	0.208	0.009
							Contract Total	**0.520**	**0.022**

$PM_{2.5}$

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.268	0.019	0.001
Dozer	200	0.59	1	15	360	24.00	0.268	0.013	0.001
							Contract Total	**0.031**	**0.001**

PM_{10}

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.276	0.019	0.001
Dozer	200	0.59	1	15	360	24.00	0.276	0.013	0.001
							Contract Total	**0.032**	**0.001**

SO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.164	0.012	0.000
Dozer	200	0.59	1	15	360	24.00	0.164	0.008	0.000
							Contract Total	**0.019**	**0.001**

VOC

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	360	24.00	0.29	0.021	0.001
Dozer	200	0.59	1	15	360	24.00	0.29	0.014	0.001
							Contract Total	**0.034**	**0.001**

Note:
1. Emission factors generated from EPA NONROAD 2005 model run for bulldozers in Brazoria County for the model year 2007.
2. Load factors from Appendix A of Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA Office of Air and Radiation Report Number NR-005c, April 2004.

Table D-E-3. NONROAD Emissions - Pipeline Trenching Option 1
600-Foot Alternative
Port Freeport Channel Widening Project

CO

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	20	20	1.00	1.32	0.005	0.005
Dump Truck	300	0.59	1	6	6	1.00	1.22	0.001	0.001
							Contract Total	0.007	0.007

NO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	20	20	1.00	4.44	0.017	0.017
Dump Truck	300	0.59	1	6	6	1.00	3.78	0.004	0.004
							Contract Total	0.022	0.022

$PM_{2.5}$

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	20	20	1.00	0.268	0.001	0.001
Dump Truck	300	0.59	1	6	6	1.00	0.229	0.000	0.000
							Contract Total	0.001	0.001

PM_{10}

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	20	20	1.00	0.276	0.001	0.001
Dump Truck	300	0.59	1	6	6	1.00	0.236	0.000	0.000
							Contract Total	0.001	0.001

SO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	20	20	1.00	0.164	0.001	0.001
Dump Truck	300	0.59	1	6	6	1.00	0.164	0.000	0.000
							Contract Total	0.001	0.001

VOC

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	20	20	1.00	0.33	0.001	0.001
Dump Truck	300	0.59	1	6	6	1.00	0.30	0.000	0.000
							Contract Total	0.002	0.002

Note:
1. Emission factors generated from EPA NONROAD 2005 model run for bulldozers in Brazoria County for the model year 2007.
2. Load factors from Appendix A of Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA Office of Air and Radiation Report Number NR-005c, April 2004.

Table D-E-4. Total Emissions from NONROAD Equipment
600-Foot Alternative
Port Freeport Channel Widening Project
(Tons of Emissions)

Pollutant	Phase 1	Phase 2	Phase 3	Clayball Pickup
CO	0.155	n/a	n/a	0.01
NO_x	0.520	n/a	n/a	0.02
$PM_{2.5}$	0.031	n/a	n/a	0.001
PM_{10}	0.032	n/a	n/a	0.001
SO_x	0.019	n/a	n/a	0.001
VOC	0.034	n/a	n/a	0.002

Notes:

1. NONROAD Equipment for Phase 1 include the following:
   - 200 HP Diesel Bulldozer
   - 300 HP Diesel Bulldozer
2. No NONROAD Equipment used in Phase 2 or Phase 3.
3. NONROAD Equipment for Clayball Pickup during Pipeline Trenching Option 1 include the following:
   - 300 HP Diesel Bulldozer
   - 300 HP Diesel Dumptruck

Table D-F-1. Emission Factors for Employee Vehicles
600-Foot Alternative
Port Freeport Channel Widening Project

Fleet Year	Type of Vehicle	EPA Category[1]	Emisson Factor (g/mile)					
			CO[2]	NOx[2]	PM2.5[3]	PM10[3]	SO2[3]	VOC[2]
1	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988
2	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988
3	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988
			177.1	**25.8**	**0.52**	**0.8**	**0.57**	**9.7**

Notes:

1. LDGV=light duty gasoline-fueled vehicles designated for transport of up to 12 people
   LDGT1=light duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6000 pounds or less
2. Emission factors for CO, NOx, and VOC are from MOBILE6.2 run using Brazoria County input file, "30aug2007brazil a0", which can be found on the TCEQ FTP site: ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/HGB/m62/2007/.
3. Emission factors for $PM_{2.5}$, PM_{10}, and SO_2 are from MOBILE6.2 run using Statewide PM1 and PM2 input files, "2007_wk_pm1_d13c5r4ihu.in" and "2007_wk_pm2_d13c5r4ihu.in", which can be found on the TCEQ FTP site: ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/Statewide/m62/2007/.

Table D-F-2. Total Emissions from Employee Vehicles
600-Foot Alternative
Port Freeport Channel Widening Project

Phase	Type of Vehicle	EPA Category	Daily Vehicles (/day)	Daily Travel - Per Vehicle			Travel Days[3] (days/yr)	Annual Travel[4] (VMT/yr)	Annual Emissions[5] (tpy)					
				On-Site[1] (VMT)	Off-Site[2] (VMT)	Total (VMT)			CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1	Cars	LDGV	14	1	50.0	51.0	24	17,136	0.1292	0.0098	0.00022	0.00047	0.00013	0.0125
	Pickups	LDGT1	6	1	50.0	51.0	24	7,344	0.0597	0.0042	0.00009	0.00020	0.00007	0.0057
2	Cars	LDGV	3	1	50.0	51.0	19	2,907	0.0219	0.0017	0.00004	0.00008	0.00002	0.0021
	Pickups	LDGT1	1	1	50.0	51.0	19	969	0.0079	0.0006	0.00001	0.00003	0.00001	0.0007
3	Cars	LDGV	20	0	50.0	50.0	38	38,143	0.2875	0.0217	0.00048	0.00105	0.00029	0.0277
	Pickups	LDGT1	10	0	50.0	50.0	38	19,071	0.1550	0.0109	0.00024	0.00053	0.00018	0.0147
								Total Car Emissions	0.4386	0.0331	0.0007	0.0016	0.0004	0.0423
								Total Pickup Emissions	0.2225	0.0156	0.0004	0.0008	0.0003	0.0211
								TOTAL MOBILE EMISSIONS	**0.661**	**0.049**	**0.0011**	**0.0024**	**0.0007**	**0.063**

Notes:
1. Daily on-site VMT is estimated based on very minimal use of personal vehicles at the site.
2. Off-Plant VMT is assumed to be 50 miles/day round trip.
3. Travel days for Phase 1 and 2 is assumed to be daily for the duration of the phase. Travel for Phase 3 is assumed to be weekly for the duration of the phase.
4. Annual travel = Daily vehicles * Total VMT * Travel days/yr.
5. Annual emissions = Emission factor * Annual travel * 1lb/453.6 grams * 1ton/2000lb

APPENDIX E

Summary of Estimated Air Emissions
500-ft Alternative

Appendix E - List of Tables
500 Foot Channel Alternative
Port Freeport Channel Widening Project

Table E-1. Summary of Emissions by Engine Type and by Activity
500 Foot Channel Alternative
Port Freeport Channel Widening Project

Engine Type - Activity	Emissions by Engine Type (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Propulsion - Dredging	10.25	79.27	1.80	1.90	13.26	1.10
Dredge Pumps - Dredging	1.82	18.44	0.42	0.44	3.04	0.16
Main Engine - Crane Dredging	0.16	1.63	0.04	0.04	0.27	0.01
Secondary - Dredging	5.24	45.81	1.04	1.10	7.59	0.55
Propulsion - Oceangoing	6.22	59.81	1.35	1.43	9.87	0.58
Secondary - Oceangoing	4.35	43.94	0.99	1.05	7.24	0.39
Vehicles	0.27	0.02	0.000	0.001	0.000	0.03
Construction	0.00	0.00	0.00	0.00	0.00	0.00
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**

Table E-2. Summary of Emissions from Propulsion Engines During Dredging Activities
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Propulsion Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	0.000	0.000	0.000	0.000	0.000	0.000
Runabout	0.000	0.000	0.000	0.000	0.000	0.000
Small Tug	0.000	0.000	0.000	0.000	0.000	0.000
Large Tug	0.000	0.000	0.000	0.000	0.000	0.000
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	0.016	0.084	0.002	0.002	0.015	0.002
Large Tug	0.573	5.813	0.131	0.138	0.957	0.051
Employee Vehicles	--	--	--	--	--	--
Hopper	4.651	47.190	1.064	1.123	7.770	0.414
Runabout	0.481	2.515	0.058	0.061	0.434	0.061
Shrimpboat	4.529	23.666	0.548	0.578	4.082	0.570
Employee Vehicles	--	--	--	--	--	--
Total from Propulsion Engine During Dredging	**10.25**	**79.27**	**1.80**	**1.90**	**13.26**	**1.10**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Propulsion Engines During Dredging	**36.2%**	**31.8%**	**32.0%**	**32.0%**	**32.1%**	**38.9%**

Table E-3. Summary of Emissions from Dredge Pumps During Dredging Activities
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Dredge Pumps (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.000	0.000	0.000	0.000	0.000	0.000
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	1.818	18.442	0.416	0.439	3.037	0.162
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Pump Engine During Dredging	**1.82**	**18.44**	**0.42**	**0.44**	**3.04**	**0.16**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Dredge Pumps During Dredging	**6.4%**	**7.4%**	**7.4%**	**7.4%**	**7.4%**	**5.7%**

Table E-4. Summary of Emissions from Main Crane Engine During Dredging Activities
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Main Crane Engine (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.161	1.635	0.037	0.039	0.269	0.014
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Crane Engine During Dredging	**0.16**	**1.63**	**0.04**	**0.04**	**0.27**	**0.01**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Main Crane Engine During Dredging	**0.6%**	**0.7%**	**0.7%**	**0.7%**	**0.7%**	**0.5%**

Table E-5. Summary of Emissions from Secondary and/or Auxiliary Engines During Dredging Activities
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Secondary Engines During Dredging (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.000	0.000	0.000	0.000	0.000	0.000
Anchor Tender	0.000	0.000	0.0000	0.0000	0.000	0.000
Runabout	0.000	0.000	0.0000	0.0000	0.000	0.000
Small Tug	0.000	0.000	0.000	0.000	0.000	0.000
Large Tug	0.000	0.000	0.000	0.000	0.000	0.000
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.066	0.345	0.008	0.008	0.060	0.008
Runabout	0.005	0.016	0.000	0.000	0.003	0.001
Large Tug	0.019	0.100	0.002	0.002	0.017	0.002
Employee Vehicles	--	--	--	--	--	--
Hopper	4.208	42.691	0.963	1.016	7.030	0.375
Runabout	0.033	0.093	0.002	0.002	0.017	0.006
Shrimpboat	0.906	2.563	0.063	0.067	0.468	0.161
Employee Vehicles	--	--	--	--	--	--
Total from Secondary Engine During Dredging	**5.24**	**45.81**	**1.04**	**1.10**	**7.59**	**0.55**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Secondary Engines During Dredging	**18.5%**	**18.4%**	**18.4%**	**18.4%**	**18.4%**	**19.6%**

Table E-6. Summary of Emissions from Propulsion Engines During Ocean-going Activities
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Propulsion Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	0.000	0.000	0.000	0.000	0.000	0.000
Runabout	0.000	0.000	0.000	0.000	0.000	0.000
Small Tug	0.000	0.000	0.000	0.000	0.000	0.000
Large Tug	0.000	0.000	0.000	0.000	0.000	0.000
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	0.000	0.000	0.0000	0.0000	0.000	0.0000
Large Tug	0.661	3.455	0.0800	0.0844	0.596	0.083
Employee Vehicles	--	--	--	--	--	--
Hopper	5.554	56.352	1.271	1.341	9.279	0.494
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Propulsion Engine During Ocean-going	**6.22**	**59.81**	**1.35**	**1.43**	**9.87**	**0.58**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Propulsion Engines During Ocean-going	**22.0%**	**24.0%**	**24.0%**	**24.0%**	**23.9%**	**20.5%**

Table E-7. Summary of Emissions from Secondary and/or Auxiliary Engines During Ocean-going Activities
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Secondary and/or Auxiliary Engines (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	0.000	0.000	0.000	0.000	0.000	0.000
Anchor Tender	0.000	0.000	0.0000	0.0000	0.0000	0.0000
Runabout	0.000	0.000	0.000	0.000	0.000	0.000
Small Tug	0.000	0.000	0.000	0.000	0.000	0.000
Large Tug	0.000	0.000	0.000	0.000	0.000	0.000
Dozers	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	0.000	0.000	0.0000	0.0000	0.000	0.000
Runabout	0.000	0.000	0.00000	0.00000	0.0000	0.0000
Large Tug	0.022	0.063	0.0015	0.0016	0.011	0.0039
Employee Vehicles	--	--	--	--	--	--
Hopper	4.325	43.879	0.990	1.044	7.225	0.385
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Total from Secondary Engine During Ocean-going	**4.35**	**43.94**	**0.99**	**1.05**	**7.24**	**0.39**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Secondary Engines During Ocean-going	**15.4%**	**17.7%**	**17.6%**	**17.6%**	**17.5%**	**13.8%**

Table E-8. Summary of Emissions from Employee Vehicles
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Employee Vechicles (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	--	--	--	--	--	--
Employee Vehicles	0.000	0.000	0.0000	0.0000	0.0000	0.000
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	0.041	0.003	0.00007	0.0001	0.00004	0.004
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	0.227	0.017	0.0004	0.0008	0.0002	0.022
Vehicles Total	**0.27**	**0.02**	**0.000**	**0.001**	**0.000**	**0.03**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Employee Vehicles	**0.9%**	**0.01%**	**0.01%**	**0.02%**	**0.001%**	**0.9%**

Table E-9. Summary of Emissions from Construction Equipment
500 Foot Channel Alternative
Port Freeport Channel Widening Project

	Emissions from Nonroad Construction Equipment Engine (tons)					
	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
Cutterhead	--	--	--	--	--	--
Anchor Tender	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Small Tug	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Dozers	0.00	0.00	0.00	0.00	0.00	0.00
Employee Vehicles	--	--	--	--	--	--
Bucket Crane	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Large Tug	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Hopper	--	--	--	--	--	--
Runabout	--	--	--	--	--	--
Shrimpboat	--	--	--	--	--	--
Employee Vehicles	--	--	--	--	--	--
Construction Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Project Total	**28.30**	**248.92**	**5.64**	**5.95**	**41.27**	**2.82**
% of Project Total from Construction Equipment Engine	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**

Table E-10. General Conformity Emissions Summary
500 Foot Channel Alternative
Port Freeport Channel Widening Project

		Tons per Year	
		NO_x	VOC
		2008	2008
Marine Vessels - Dredging	Dredges	110.30	0.97
	Anchor Tender	--	--
	Runabouts	2.71	0.069
	Tugs	5.91	0.05
	Shrimpboat	26.23	0.73
	Subtotal	145.15	1.83
Marine Vessels - Oceangoing	Dredges	100.23	0.88
	Anchor Tender	--	--
	Runabouts	--	--
	Tugs	3.52	0.09
	Shrimpboat	--	--
	Subtotal	103.75	0.97
Construction	Dozers	--	--
Employee	Vehicles	0.02	0.03
	Total	**248.92**	**2.82**

Table E-A-1. Assumptions for Phase 1 Marine Equipment Engine HP, Load Factor, and Hours of Operation
500 Foot Channel Alternative
Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	24" Cutterhead Discharge	1	4,000	Main Pump	Diesel	0.8	2,560	20	100%	0	0
				Secondary	Diesel	0.4	160	20	100%	0	0
				Auxiliary	Diesel	0.4	1,350	24	100%	0	0
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	750	20	100%	0	0
				Auxiliary	Diesel	0.2	67	20	100%	0	0
	Crew/Survey Boat (Runabouts)	2	50	Propulsion	Diesel	0.4	50	20	100%	0	0
				Auxiliary	Diesel	0.2	17	20	100%	0	0
	Anchor Tender	1	100	Propulsion	Diesel	0.4	100	20	100%	0	0
				Auxiliary	Diesel	0.2	22	20	100%	0	0
	Towing Tug (Large)	1	1,500	Propulsion	Diesel	0.4	1,500	20	100%	0	0
				Auxiliary	Diesel	0.2	67	20	100%	0	0
Mobilization / Demobilization	24" Cutterhead Discharge	1	4,000	Main Pump	Diesel	0.8	2,560		0%	0	0
				Secondary	Diesel	0.4	160	24	100%	0	0
				Auxiliary	Diesel	0.4	1,350	24	100%	0	0
	Work Tug (small)	1	750	Propulsion	Diesel	0.4	750	20	100%	0	0
				Auxiliary	Diesel	0.2	67	20	100%	0	0
	Crew/Survey Boat (Runabouts)	2	50	Propulsion	Diesel	0.4	50		0%	0	0
				Auxiliary	Diesel	0.2	17		0%	0	0
	Anchor Tender	1	100	Propulsion	Diesel	0.4	100	24	100%	0	0
				Auxiliary	Diesel	0.2	22	24	100%	0	0
	Towing Tug (Large)	1	1,500	Main Engine	Diesel	0.4	1,500	20	100%	0	0
				Auxiliary	Diesel	0.2	67	20	100%	0	0
Total Engine Hours in Phase 1											0
Total Engine Hours for all Phases											30,653
Percent of Total Engine Hours - Phase 1 Engine Hours											0.0%

Notes:

1. Hours of operation for Cutterhead dredge pump and cutter based on 20 hours/day and total phase duration of 12 days at rate of 25,000 CY per day.
2. Mobilization/Demobilization of pipeline using Large and Small Tug is assumed to be 12 days at a operating rate of 20 hrs/day. Mobilzation/Demobilzation of Cutterhead due to travel via interstate waterways into Houston-Galveston area is assumed to be 4 days total.
3. Cutterhead dredge is assumed to have a pontoon hull structure without propulsion. Dredge type and engine horsepower break-down is based on specifications for Ellicott's "Super-Dragon" Model Series 4170, available at www.dredge.com/specs/printer-friendly/4170.htm
4. Support equipment vessel (i.e. tugs, tenders, and crew boats) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table E-A-2. Assumptions for Phase 2 Marine Equipment Engine HP, Load Factor, and Hours of Operation
500 Foot Channel Alternative
Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hrs/day)	Daily Engine Usage %	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	18	100%	26	468
				Auxiliary	Diesel	0.4	205	18	100%	26	468
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	18	100%	26	468
				Auxiliary	Diesel	0.2	17	18	100%	26	468
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.8	2,000	16	100%	26	416
				Auxiliary	Diesel	0.4	67	16	100%	26	416
Mobilization / Demobilization	Bucket Crane	1	500	Main Engine	Diesel	0.8	500	0	0%	0	0
				Auxiliary	Diesel	0.4	205	24	100%	0	0
	Crew/Survey Vessel (Runabout)	1	50	Propulsion	Diesel	0.4	50	0	100%	0	0
				Auxiliary	Diesel	0.2	17	0	100%	0	0
	Towing Vessel (Large Tug)	1	2,000	Propulsion	Diesel	0.4	2,000	16	100%	30	480
				Auxiliary	Diesel	0.2	67	16	100%	30	480
Total Engine Hours in Phase 2											3,664
Total Engine Hours for all Phases											30,653
Percent of Total Engine Hours - Phase 2 Engine Hours											12.0%

Notes:

1. Hours of operation for Bucket Crane dredge based on 18 hours/day and total phase duration of about 25 days at rate of 8,000 CY per day.
2. Mobilization/Demobilization setup for all equipment assumed to be 48 hours.
3. The main engine of the bucket crane dredge is not a propulsion engine but is used to power the bucket during dredging. The auxillary engine for the bucket dredge was based on the minimum auxiliary horsepower cited in Starcrest's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005, page 156. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.
4. Support equipment vessel (i.e. tugs and crew boats) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005. Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table E-A-3. Assumptions for Phase 3 Marine Equipment Engine HP, Load Factor, and Hours of Operation
500 Foot Channel Alternative
Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per day (hr/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Dredge	Generic Large Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	137	1,242
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	137	1,553
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	137	1,553
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	137	1,461
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	137	1,827
	Crew/Survey Boat (Runabout)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	137	2,795
				Auxiliary	Diesel	0.2	17	20.4	100%	137	2,795
	Shrimp Boat	2	1,000	Propulsion	Diesel	0.4	1,000	24	100%	137	6,576
				Auxiliary	Diesel	0.2	200	24	100%	137	6,576
Mobilization / Demobilization	Generic Large Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	100%	30	612
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	0	0
				Dredge Pump(s)	Diesel	0.8	1,700	0	56%	0	0
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	30	320
				Auxiliary - Dredging	Diesel	0.8	3,345	0	56%	30	0
	Crew/Survey Boat (Runabout)	1	250	Propulsion	Diesel	0.4	250	0	100%	0	0
				Auxiliary	Diesel	0.2	17	0	100%	0	0
	Shrimp Boat	2	1,000	Propulsion	Diesel	0.4	1,000	24	100%	0	0
				Auxiliary	Diesel	0.2	200	24	100%	0	0
Total Engine Hours in Phase 3											26,989
Total Engine Hours for all Phases											30,653
Percent of Total Engine Hours - Phase 3 Engine Hours											88.0%

Notes:

1. Total cycle time for Hopper Dredge is assumed to be 81 minutes and hopper dredge downtime is assumed to be 15%.
   Minute break-down of hopper dredge cycle is as follows:
   - Load time with dredge pumps on is 45 minutes.
   - Propulsion engine operate continously during entire cycle time of 81 minutes.
   - Bottom dumping without pumpout pumps takes 5 minutes.
   - Auxillary engines operate continuously, 24 hours per day.
2. Mobilization/Demobilization of Hopper due travel via interstate waterways into Houston-Galveston area is assumed to be 4 days total.
3. Hopper Dredge engine horsepower breakdown is based on specification for Great Lakes Dredge & Dock Company "Sugar Island Trailing Suction Hopper Dredge" with 3,600 yd^3 hopper capacity and total installed power of 9,395 hp. Specification is available at http://www.gldd.com/upload/zip/fleet/SUGAR_ISLAND_FLEET_SHEET.pdf.
4. Support equipment vessel (i.e. crew boat and shripm boat) engine horsepower break-down based on main engine and auxiliary engine data found in Table 3.1 and Table 3.2 of Starcrest Consulting Group's *Port of Los Angeles Baseline Air Emissions Inventory - 2001*, prepared for the Port of Los Angeles, July 2005.
   Available online at http://www.portoflosangeles.org/DOC/REPORT_Final_BAEI.pdf.

Table E-A-4. Assumptions for Marine Equipment Engine HP, Load Factor, and Hours of Operation - Additional Maintenance Dredging
Additional 480,000 cy/yr Maintenance Dredging
500-Ft Alternative
Port Freeport Channel Widening Project

Activity	Equipment Type	Quantity	Total Installed Power (hp)	Engine Type	Engine Fuel Type	Engine Load Factor	Engine hp (hp)	Hours of Operation per Day (hrs/day)	Daily Engine Usage (%)	Total Days of Operation (days)	Total Engine Hours of Operation (hrs)
Additional Maintenance Dredging	Hopper Dredge	1	9,395	Propulsion - Oceangoing	Diesel	0.8	4,350	20.4	44%	12	108
				Propulsion - Dredging	Diesel	0.8	4,350	20.4	56%	12	137
				Dredge Pump(s)	Diesel	0.8	1,700	20.4	56%	12	137
				Auxiliary - Oceangoing	Diesel	0.8	3,345	24	44%	12	127
				Auxiliary - Dredging	Diesel	0.8	3,345	24	56%	12	161
	Runabout (Large)	1	250	Propulsion	Diesel	0.4	250	20.4	100%	12	245
				Auxiliary	Diesel	0.2	17	20.4	100%	12	245
	Shrimp Boat (Turtle Trawl)	2	1,000	Propulsion	Diesel	0.4	1,000	24	100%	12	288
				Auxiliary	Diesel	0.2	200	24	100%	12	288
Total Engine Hours											1,735

Notes:
1. Days of operation are determined assuming 40,000 CY/day production rate for a hopper dredge removing unconsolidated, predominantly silty dredged material.

Table E-A-5. Marine Engine Emission Factors and Fuel Consumption Algorithms
(in g/kW-hr, for all marine engines)

Statistical Parameter	Exponent (x)	Intercept (b)	Coefficient (a)
CO	1	0	0.8378
NO_X	1.5	10.4496	0.1255
PM	1.5	0.2551	0.0059
PM2.5	1.5	0.2551	0.0059
PM10	1.5	0.2551	0.0059
SO_X	n/a	0	2.3735
VOC (HC)	1.5	0	0.0667

Notes:

1.) All regressions but SO_2 are in the form of:

Emissions Rate (g/hp-hr) = (a*(Fractional Load)$^{-x}$ + b) * 0.7457
where the conversion factor of 0.7457 kW/hp is used to calculate the emission factor in g/hp-hr

2.) Fractional Load is equal to actual engine output divided by rated engine output.

3.) The SO_2 regression is the form of:

Emissions Rate (g/hp-hr) = a*(Fuel Sulfur Flow in g/hp-hr) + b
where Fuel Sulfur Flow is the Fuel Consumption times the sulfur content of the fuel;
The sulfur content for the fuel consumption regression was set to 3300 parts per million (0.33 wt%)

4.) **Fuel Consumption (g/hp-hr) = (14.12 / (Fractional Load) + 205.717) * 0.7457**

5.) n/a is not applicable, n/s is not statistically significant.

6.) All information shown above is detailed in Table 5-1 of the EPA technical report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", EPA 420-R-00-002, February 2000.

Table E-B-1. Phase 1 Marine Equipment Emission Factors and Emission Rates - Cutterhead
Freeport Channel Widening Project

	Dredge											Mob/Demob										
	24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)	
	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Pump	Seconday	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary
hp	2,560	160	1,350	750	67	50	17	100	22	1,500	67	2,560	160	1,350	750	67	50	17	100	22	1,500	67
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.4	0.4	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.8	0.4	0.4	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2
Age Factor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)																						
CO	0.780934	1.561869	1.561869	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	0.780934	1.561869	1.561869	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737	1.561869	3.123737
NO_X	7.923056	8.162195	8.162195	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	7.923056	8.162195	8.162195	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583	8.162195	8.838583
PM	0.196377	0.207619	0.207619	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.196377	0.207619	0.207619	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417	0.207619	0.239417
PM2.5	0.178703	0.188933	0.188933	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.178703	0.188933	0.188933	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870	0.188933	0.217870
PM10	0.188522	0.199314	0.199314	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.188522	0.199314	0.199314	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841	0.199314	0.229841
SO_X	1.304627	1.407716	1.407716	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.304627	1.407716	1.407716	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894	1.407716	1.613894
VOC (HC)	0.069511	0.196607	0.196607	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.069511	0.196607	0.196607	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090	0.196607	0.556090
Emission Rate (tons/hr)																						
CO	0.001763	0.000110	0.000930	0.000516	0.000046	0.000034	0.000012	0.000069	0.000015	0.001033	0.000046	0.001763	0.000110	0.000930	0.000516	0.000046	0.000034	0.000012	0.000069	0.000015	0.001033	0.000046
NO_X	0.017886	0.000576	0.004858	0.002699	0.000131	0.000180	0.000033	0.000360	0.000043	0.005398	0.000131	0.017886	0.000576	0.004858	0.002699	0.000131	0.000180	0.000033	0.000360	0.000043	0.005398	0.000131
PM	0.000443	0.000015	0.000124	0.000069	0.000004	0.000005	0.000001	0.000009	0.000001	0.000137	0.000004	0.000443	0.000015	0.000124	0.000069	0.000004	0.000005	0.000001	0.000009	0.000001	0.000137	0.000004
PM2.5	0.000403	0.000013	0.000112	0.000062	0.000003	0.000004	0.000001	0.000008	0.000001	0.000125	0.000003	0.000403	0.000013	0.000112	0.000062	0.000003	0.000004	0.000001	0.000008	0.000001	0.000125	0.000003
PM10	0.000426	0.000014	0.000119	0.000066	0.000003	0.000004	0.000001	0.000009	0.000001	0.000132	0.000003	0.000426	0.000014	0.000119	0.000066	0.000003	0.000004	0.000001	0.000009	0.000001	0.000132	0.000003
SO_X	0.002945	0.000099	0.000838	0.000466	0.000024	0.000031	0.000006	0.000062	0.000008	0.000931	0.000024	0.002945	0.000099	0.000838	0.000466	0.000024	0.000031	0.000006	0.000062	0.000008	0.000931	0.000024
VOC (HC)	0.000157	0.000014	0.000117	0.000065	0.000008	0.000004	0.000002	0.000009	0.000003	0.000130	0.000008	0.000157	0.000014	0.000117	0.000065	0.000008	0.000004	0.000002	0.000009	0.000003	0.000130	0.000008

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.

A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.

The following assumptions applied to the load factor determination during dredging operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).

D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.

D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table E-B-2. Phase 2 Marine Equipment Emission Factors and Emission Rates - Bucket Crane
Freeport Channel Widening Project

	Dredge						Mob/Demob Setup					
	Bucket Crane		Crew/Survey Vessel (Runabout)		Towing Vessel (Large Tug)		Bucket Crane		Crew/Survey Vessel (Runabout)		Towing Vessel (Large Tug)	
	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary
hp	500	205	50	17	2,000	67	500	205	50	17	2,000	67
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.4	0.4	0.2	0.8	0.4	0.8	0.4	0.4	0.2	0.4	0.2
Age Factor	-	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)												
CO	0.780934	1.561869	1.561869	3.123737	0.780934	1.561869	0.780934	1.561869	1.561869	3.123737	1.561869	3.123737
NO_X	7.923056	8.162195	8.162195	8.838583	7.923056	8.162195	7.923056	8.162195	8.162195	8.838583	8.162195	8.838583
PM	0.196377	0.207619	0.207619	0.239417	0.196377	0.207619	0.196377	0.207619	0.207619	0.239417	0.207619	0.239417
PM2.5	0.178703	0.188933	0.188933	0.217870	0.178703	0.188933	0.178703	0.188933	0.188933	0.217870	0.188933	0.217870
PM10	0.188522	0.199314	0.199314	0.229841	0.188522	0.199314	0.188522	0.199314	0.199314	0.229841	0.199314	0.229841
SO_X	1.304627	1.407716	1.407716	1.613894	1.304627	1.407716	1.304627	1.407716	1.407716	1.613894	1.407716	1.613894
VOC (HC)	0.069511	0.196607	0.196607	0.556090	0.069511	0.196607	0.069511	0.196607	0.196607	0.556090	0.196607	0.556090
Emission Rate (tons/hr)												
CO	0.000344	0.000141	0.000034	0.000012	0.001377	0.000046	0.000344	0.000141	0.000034	0.000012	0.001377	0.000046
NO_X	0.003493	0.000738	0.000180	0.000033	0.013974	0.000241	0.003493	0.000738	0.000180	0.000033	0.007198	0.000131
PM	0.000087	0.000019	0.000005	0.000001	0.000346	0.000006	0.000087	0.000019	0.000005	0.000001	0.000183	0.000004
PM2.5	0.000079	0.000017	0.000004	0.000001	0.000315	0.000006	0.000079	0.000017	0.000004	0.000001	0.000167	0.000003
PM10	0.000083	0.000018	0.000004	0.000001	0.000332	0.000006	0.000083	0.000018	0.000004	0.000001	0.000176	0.000003
SO_X	0.000575	0.000127	0.000031	0.000006	0.002301	0.000042	0.000575	0.000127	0.000031	0.000006	0.001241	0.000024
VOC (HC)	0.000031	0.000018	0.000004	0.000002	0.000123	0.000006	0.000031	0.000018	0.000004	0.000002	0.000173	0.000008

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.

A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.

The following assumptions applied to the load factor determination during dredging operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).

D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.

D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table E-B-3. Phase 3 Marine Equipment Emission Factors and Emission Rates - Hopper
Freeport Channel Widening Project

	Dredge									Mob/Demob Towing	
	Generic Large Hopper Dredge					Crew/Survey Boat (Runabout)		Shrimp Boat		Generic Large Hopper Dredge	
	Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxiliary - Dredging	Propulsion	Secondary	Propulsion	Secondary	Propulsion - Oceangoing	Auxiliary - Oceangoing
hp	4,350	4,350	1,700	3,345	3,345	250	17	1,000	200	4,350	4,350
Fuel Type	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Load Factor	0.8	0.8	0.8	0.8	0.8	0.4	0.2	0.4	0.2	0.8	0.8
Age Factor	-	-	-	-	-	-	-	-	-	-	-
Emission Factors (Gram/hp-hr)											
CO	0.780934	0.780934	0.780934	0.780934	0.780934	1.561869	3.123737	1.561869	3.123737	0.780934	0.780934
NO_X	7.923056	7.923056	7.923056	7.923056	7.923056	8.162195	8.838583	8.162195	8.838583	7.923056	7.923056
PM	0.196377	0.196377	0.196377	0.196377	0.196377	0.207619	0.239417	0.207619	0.239417	0.196377	0.196377
PM2.5	0.178703	0.178703	0.178703	0.178703	0.178703	0.188933	0.217870	0.188933	0.217870	0.178703	0.178703
PM10	0.188522	0.188522	0.188522	0.188522	0.188522	0.199314	0.229841	0.199314	0.229841	0.188522	0.188522
SO_X	1.304627	1.304627	1.304627	1.304627	1.304627	1.407716	1.613894	1.407716	1.613894	1.304627	1.304627
VOC (HC)	0.069511	0.069511	0.069511	0.069511	0.069511	0.196607	0.556090	0.196607	0.556090	0.069511	0.069511
Emission Rate (tons/hr)											
CO	0.002996	0.002996	0.001171	0.002304	0.002304	0.000172	0.000012	0.000689	0.000138	0.002996	0.002996
NO_X	0.030393	0.030393	0.011878	0.023371	0.023371	0.000900	0.000033	0.003599	0.000390	0.030393	0.030393
PM	0.000753	0.000753	0.000294	0.000579	0.000579	0.000023	0.000001	0.000092	0.000011	0.000753	0.000753
PM2.5	0.000686	0.000686	0.000268	0.000527	0.000527	0.000021	0.000001	0.000083	0.000010	0.000686	0.000686
PM10	0.000723	0.000723	0.000283	0.000556	0.000556	0.000022	0.000001	0.000088	0.000010	0.000723	0.000723
SO_X	0.005005	0.005005	0.001956	0.003848	0.003848	0.000155	0.000006	0.000621	0.000071	0.005005	0.005005
VOC (HC)	0.000267	0.000267	0.000104	0.000205	0.000205	0.000022	0.000002	0.000087	0.000025	0.000267	0.000267

Notes:

1.) The dredge type, engine type, horsepower, and fuel type were based on information provided by project sponsors.

2.) The engine load factors for the dredges and support equipment were determined from Table 5-2 of the EPA Report "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data", February 2000.

A survey of dredge engine sizes along with input from project sponsors was used to determine which operating mode and hence which load factor applied to each engine.

The following assumptions applied to the load factor determination during dredging operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.8 load factor.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor for the entire dredging cycle time.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for all of the engines based on the specific operation for each engine type (e.g. propulsion, dredge pumps, and auxiliary).

D.) The propulsion engines on the support equipment vessels were assumed to operate at intermittent times during the dredging operations and were also determined to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

The following assumptions applied to the load factor determination during ocean-going (mobilization/demobilization) operations:

A.) The main engines on the Cutterhead and Bucket Crane dredges were assumed to be non-operational.

B.) The secondary engines on the Cutterhead and Bucket Crane dredges were assumed to operate at 0.4 load factor.

C.) The generic large hopper dredge was assumed to utilize a 0.8 load factor for propulsion and auxiliary engines.

D.) The propulsion engines on the support equipment vessels were to operate at the 0.4 "slow cruise" load factor.

E.) The secondary engines on the support equipment were assumed to be auxiliary engines that operate sparingly during support equipment operations and were determined to operate at the 0.2 "maneuvering" load factor.

3.) The emission factors were calculated according to the algorithm table and formulas detailed on page 5-3 of the EPA report. The emissions rate formula and algorithm table are also shown on Table A-4, "Marine Engine Emission Factor and Fuel Consumption Algorithms".

4.) The Emission Rate in tons/hr is based on the following formula: Emission Rate = hp*LF*EF*(0.0022046 lbs/gram)*(1 ton/2000 lbs).

Table E-C-1. Phase 1 Marine Equipment Hours of Operation
500 Foot Channel Alternative
Port Freeport Channel Widening Project

			Dredge											Mobilization / Demobilization											
			24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (Runabouts)		Anchor Tender		Towing Tug (Large)		24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat (2 Runabouts)		Anchor Tender		Towing Tug (Large)	
Contract No.	Location/Disposal Site	Dredge	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary
1		Hydraulic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table E-C-2. Phase 2 Marine Equipment Hours of Operation
500 Foot Channel Alternative
Port Freeport Channel Widening Project

			Dredge											
			Bucket Crane		Crew/Survey Vessel		Towing Vessel (Large		Bucket Crane		Crew/Survey Vessel		Towing Vessel (Large	
Contract No.	Location/Disposal Site	Dredge	Main Engine	Auxiliary	Propulsion	Secondary	Propulsion	Secondary	Main Engine	Secondary	Propulsion	Secondary	Propulsion	Secondary
2	150,000 CY of Clay (placed in ODMDS)	Bucket Crane	468	468	468	468	416	416	0	0	0	0	480	480

Table E-C-3. Phase 3 Marine Equipment Hours of Operation
500 Foot Channel Alternative
Port Freeport Channel Widening Project

			Dredge							Mobilization / Demobilization			
			Generic Large Hopper Dredge			Crew/Survey Boat (Runabout)		Shrimp Boats (Total of Two)		Generic Large Hopper Dredge		Shrimp Boats (Total of Two)	
Contract No.	**Location/Disposal Site**	**Dredge**	Propulsion	Dredge Pump(s)	Auxillary & Misc.	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Auxillary & Misc.	Propulsion	Secondary
3	2,750,000 CY (placed in ODMDS)	Hopper	2,795	1,553	3,288	2,795	2,795	6,576	6,576	612	320	0	0

Table E-C-4. Marine Equipment Hours of Operation - Additional Maintenance Dredging
500-Ft Alternative
Freeport Channel Widening Project

			Dredge										Mobilization / Demobilization	
			Generic Large Hopper Dredge						Crew/Survey Boat (Runabout)		Shrimp Boats (Total of Two)		Generic Large Hopper Dredge	
Contract No.	Location/Disposal Site	Dredge	Propulsion Ocean Going	Propulsion Dredging	Dredge Pump(s)	Pumpout Pump(s)	Auxillary Oceangoing	Auxiliary Dredging	Propulsion	Secondary	Propulsion	Secondary	Propulsion	Auxillary & Misc.
3	480,000 CY of Clay (placed in ODMDS)	Hopper	108	137	137	0	127	161	245	245	288	288	0	0

Table E-D-1. Marine Equipment Estimated Emissions for Phase 1 - Cutterhead
500 Foot Channel Alternative
Port Freeport Channel Widening Project
(tons per year)

Phase No.	Pollutant	Dredge	Dredge										Mobilization / Demobilization										Total Phase Emissions
			24" Cutter Discharge			Work Tug (small)		Crew/Survey Boat		Anchor Tender		Towing Tug (Large)											
			Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Pump	Secondary	Auxiliary & Misc.	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	
1	CO	Hydraulic	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
1	NOX	Hydraulic	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
1	PM2.5	Hydraulic	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
1	PM10	Hydraulic	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
1	SOX	Hydraulic	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00
1	VOC	Hydraulic	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00

Table E-D-2. Marine Equipment Estimated Emissions for Phase 2 - Bucket Crane
500 Foot Channel Alternative
Port Freeport Channel Widening Project
(tons per year)

			Dredge						Mobilization / Demobilization						Total Phase Emissions
			Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		Bucket Crane		Crew/Survey Vessel (Runabout)		Large Tug		
Phase No.	Pollutant	Dredge	Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	Main Engine	Auxiliary	Propulsion	Auxiliary	Propulsion	Auxiliary	
2	CO	Bucket Crane	0.1611	0.0661	0.0161	0.0055	0.5730	0.0192	0.0000	0.0000	0.0000	0.0000	0.6611	0.0221	1.52
2	NOX	Bucket Crane	1.6349	0.3453	0.0842	0.0155	5.8131	0.1003	0.0000	0.0000	0.0000	0.0000	3.4549	0.0627	11.51
2	PM2.5	Bucket Crane	0.0369	0.0080	0.0019	0.0004	0.1311	0.0023	0.0000	0.0000	0.0000	0.0000	0.0800	0.0015	0.26
2	PM10	Bucket Crane	0.0389	0.0084	0.0021	0.0004	0.1383	0.0024	0.0000	0.0000	0.0000	0.0000	0.0844	0.0016	0.28
2	SOX	Bucket Crane	0.2692	0.0595	0.0145	0.0028	0.9572	0.0173	0.0000	0.0000	0.0000	0.0000	0.5959	0.0114	1.93
2	VOC	Bucket Crane	0.0143	0.0083	0.0020	0.0010	0.0510	0.0024	0.0000	0.0000	0.0000	0.0000	0.0832	0.0039	0.17

Table E-D-3. Marine Equipment Estimated Emissions for Phase 3 - Hopper
500 Foot Channel Alternative
Port Freeport Channel Widening Project
(tons per year)

Phase No.	Pollutant	Dredge	Dredge									Mobilization / Demobilization				Total Phase Emissions
			Generic Large Hopper Dredge					Crew/Survey Boat		Shrimp Boat		Generic Large Hopper		Shrimp Boat		
			Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxillary - Dredging	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion - Oceangoing	Auxiliary - Oceangoing	Propulsion	Auxiliary	
3	CO	Hopper	3.7210	4.6513	1.8177	3.3663	4.2078	0.4812	0.0327	4.5286	0.9057	1.8333	0.9586	0.0000	0.0000	26.50
3	NOX	Hopper	37.7520	47.1900	18.4421	34.1529	42.6912	2.5145	0.0926	23.6662	2.5627	18.6004	9.7257	0.0000	0.0000	237.39
3	PM2.5	Hopper	0.8515	1.0644	0.4160	0.7703	0.9629	0.0582	0.0023	0.5478	0.0632	0.4195	0.2194	0.0000	0.0000	5.38
3	PM10	Hopper	0.8983	1.1228	0.4388	0.8126	1.0158	0.0614	0.0024	0.5779	0.0666	0.4426	0.2314	0.0000	0.0000	5.67
3	SOX	Hopper	6.2163	7.7704	3.0367	5.6237	7.0296	0.4337	0.0169	4.0817	0.4679	3.0628	1.6015	0.0000	0.0000	39.34
3	VOC	Hopper	0.3312	0.4140	0.1618	0.2996	0.3745	0.0606	0.0058	0.5701	0.1612	0.1632	0.0853	0.0000	0.0000	2.63

Table E-D-4. Total Emissions from Marine Equipment
500 Foot Channel Alternative
Port Freeport Channel Widening Project
(Tons per Year)

Phase	Location/Disposal Site	Dredge Type	CO	NO_X	$PM_{2.5}$	PM_{10}	SO_X	VOC
1		Cutterhead	0.00	0.00	0.00	0.00	0.00	0.00
2	201,000 CY (placed in ODMDS)	Bucket Crane	1.52	11.51	0.26	0.28	1.93	0.17
3	1,363,000 CY (placed in ODMDS)	Hopper	26.50	237.39	5.38	5.67	39.34	2.63
		TOTAL	28.03	248.90	5.64	5.95	41.27	2.79

Table E-D-5. Marine Equipment Estimated Emissions for Additional Maintenance Dredging
600-Ft Alternative
Port Freeport Channel Widening
(tons per year)

Phase No.	Pollutant	Dredge	Dredge									Mobilization / Demobilization		Total Phase Emissions
			Generic Large Hopper Dredge					Crew/Survey Boat		Shrimp Boat		Generic Large Hopper		
			Propulsion Oceangoing	Propulsion - Dredging	Dredge Pump(s)	Auxiliary - Oceangoing	Auxillary - Dredging	Propulsion	Auxiliary	Propulsion	Auxiliary	Propulsion - Oceangoing	Auxiliary - Oceangoing	
3	CO	Hopper	0.3227	0.4107	0.1605	0.2919	0.3715	0.0421	0.0029	0.1983	0.0397	0.0000	0.0000	1.84
3	NOX	Hopper	3.2737	4.1665	1.6283	2.9616	3.7693	0.2203	0.0081	1.0365	0.1122	0.0000	0.0000	17.18
3	PM2.5	Hopper	0.0738	0.0940	0.0367	0.0668	0.0850	0.0051	0.0002	0.0240	0.0028	0.0000	0.0000	0.39
3	PM10	Hopper	0.0779	0.0991	0.0387	0.0705	0.0897	0.0054	0.0002	0.0253	0.0029	0.0000	0.0000	0.41
3	SOX	Hopper	0.5391	0.6861	0.2681	0.4877	0.6207	0.0380	0.0015	0.1788	0.0205	0.0000	0.0000	2.84
3	VOC	Hopper	0.5391	0.0366	0.0143	0.0260	0.0331	0.0053	0.0005	0.0250	0.0071	0.0000	0.0000	0.69

Table E-E-1. Dozer Emission Factors from NONROAD Model
(2007 Model Year)
Port Freeport Channel Widening Project

Range	HP	SCC	EQUIP	CLASSIFICATION	Engine Type	Fuel Type	VOC exhaust g/HP-hr	PM10 exhaust g/HP-hr	PM25 exhaust g/HP-hr	VOCCrank case g/HP-hr	CO exhaust g/HP-hr	NOx exhaust g/HP-hr	SO2 exhaust g/HP-hr
50 < HP <= 75	75	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.5376	0.4198	0.4072	0.0108	3.7378	5.0503	0.1822
75 < HP <= 100	100	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.5376	0.4198	0.4072	0.0108	3.7378	5.0503	0.1822
100 < HP <= 175	175	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.3678	0.2424	0.2351	0.0074	1.4623	4.6212	0.1642
175 < HP <= 300	300	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.3203	0.1984	0.1924	0.0064	1.2348	4.3835	0.1642
300 < HP <= 600	600	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.2798	0.1978	0.1919	0.0056	1.9510	5.0130	0.1642
600 < HP <= 750	750	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.2556	0.2100	0.2037	0.0051	2.3285	5.0029	0.1643
750 < HP <= 1000	1000	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.4649	0.2592	0.2514	0.0093	2.2777	6.4108	0.1641
1000 < HP <= 1200	1200	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.4649	0.2592	0.2514	0.0093	2.2777	6.4108	0.1641
1200 < HP <= 2000	2000	2270002069	Crawler Tractor/Dozers	Construction and Mining Equipment	Diesel	Diesel	0.4649	0.2592	0.2514	0.0093	2.2777	6.4108	0.1641

Note:
1. Emission factors generated from EPA NONROAD 2005 model run for bulldozers in Brazoria County for the model year 2007.

Table E-E-2. Phase 1 NONROAD Emissions
500 Foot Channel Alternative
Port Freeport Channel Widening Project

CO

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	0	0	1.23	0.000	--
Dozer	200	0.59	1	15	0	0	1.23	0.000	--
							Contract Total	0.000	0.000

NO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	0	0	4.38	0.000	--
Dozer	200	0.59	1	15	0	0	4.38	0.000	--
							Contract Total	0.000	0.000

$PM_{2.5}$

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	0	0	0.192	0.000	--
Dozer	200	0.59	1	15	0	0	0.192	0.000	--
							Contract Total	0.000	0.000

PM_{10}

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	0	0	0.198	0.000	--
Dozer	200	0.59	1	15	0	0	0.198	0.000	--
							Contract Total	0.000	0.000

SO_x

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	0	0	0.164	0.000	--
Dozer	200	0.59	1	15	0	0	0.164	0.000	--
							Contract Total	0.000	0.000

VOC

Equipment	HP	Load Factor	No. of Each	Hrs./Day	Hours in Contract	Contract Duration (Days)	Emission Factor (g/HP-hr)	Total Equipment Emissions Tons	Total Equipment Emissions Tons/Day
Dozer	300	0.59	1	15	0	0	0.33	0.000	--
Dozer	200	0.59	1	15	0	0	0.33	0.000	--
							Contract Total	0.000	0.000

Note:
1. Emission factors generated from EPA NONROAD 2005 model run for bulldozers in Brazoria County for the model year 2007.
2. Load factors from Appendix A of Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA Office of Air and Radiation Report Number NR-005c, April 2004.

Table E-E-3. Total Emissions from NONROAD Equipment
500 Foot Channel Alternative
Port Freeport Channel Widening Project

CONSTRUCTION PERIOD
(TONS OF EMISSIONS)

Pollutant	Phase 1	Phase 2	Phase 3
CO	0.000	n/a	n/a
NO_x	0.000	n/a	n/a
$PM_{2.5}$	0.000	n/a	n/a
PM_{10}	0.000	n/a	n/a
SO_x	0.000	n/a	n/a
VOC	0.000	n/a	n/a
TOTALS	0.000	**n/a**	**n/a**

Notes:

1. NONROAD Equipment for Phase 1 include the following:
   - 200 HP Diesel Bulldozer
   - 300 HP Diesel Bulldozer
2. No NONROAD Equipment used in Phase 2 or Phase 3.

Table E-F-1. Emission Factors for Employee Vehicles
Port Freeport Channel Widening Project

Fleet Year	Type of Vehicle	EPA Category[1]	Emisson Factor (g/mile)					
			CO^2	NOx^2	$PM2.5^3$	$PM10^3$	$SO2^3$	VOC^2
1	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988
2	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988
3	Cars	LDGV	6.8379	0.5163	0.0114	0.0249	0.0068	0.6596
	Pickups	LDGT1	7.3724	0.5176	0.0116	0.0252	0.0088	0.6988

Notes:

1. LDGV=light duty gasoline-fueled vehicles designated for transport of up to 12 people
   LDGT1=light duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6000 pounds or less
2. Emission factors for CO, NOx, and VOC are from MOBILE6.2 run using Brazoria County input file, "30aug2007brazi1a0", which can be found on the TCEQ FTP site: ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/HGB/m62/2007/.
3. Emission factors for $PM_{2.5}$, PM_{10}, and SO_2 are from MOBILE6.2 run using Statewide PM1 and PM2 input files, "2007_wk_pm1_d13c5r4ihu.in" and "2007_wk_pm2_d13c5r4ihu.in", which can be found on the TCEQ FTP site: ftp://ftp.tnrcc.state.tx.us/pub/OEPAA/TAD/Modeling/Mobile_EI/Statewide/m62/2007/.

Table E-F-2. Total Emissions from Employee Vehicles
500 Foot Channel Alternative
Port Freeport Channel Widening Project

Phase	Type of Vehicle	EPA Category	Daily Vehicles (/day)	Daily Travel - Per Vehicle On-Site[1] (VMT)	Off-Site[2] (VMT)	Total (VMT)	Travel Days[3] (days/yr)	Annual Travel[4] (VMT/yr)	Annual Emissions[5] (tpy) CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC
1	Cars	LDGV	14	1	50.0	51.0	0	0	0.0000	0.0000	0.00000	0.00000	0.00000	0.0000
	Pickups	LDGT1	6	1	50.0	51.0	0	0	0.0000	0.0000	0.00000	0.00000	0.00000	0.0000
2	Cars	LDGV	3	1	50.0	51.0	26	3,978	0.0300	0.0023	0.00005	0.00011	0.00003	0.0029
	Pickups	LDGT1	1	1	50.0	51.0	26	1,326	0.0108	0.0008	0.00002	0.00004	0.00001	0.0010
3	Cars	LDGV	20	0	50.0	50.0	20	19,571	0.1475	0.0111	0.00025	0.00054	0.00015	0.0142
	Pickups	LDGT1	10	0	50.0	50.0	20	9,786	0.0795	0.0056	0.00013	0.00027	0.00009	0.0075
								Total Car Emissions	0.1775	0.0134	0.0003	0.0006	0.0002	0.0171
								Total Pickup Emissions	0.0903	0.0063	0.0001	0.0003	0.0001	0.0086
								TOTAL MOBILE EMISSIONS	**0.268**	**0.020**	**0.0004**	**0.0010**	**0.0003**	**0.026**

Notes:

1. Daily on-site VMT is estimated based on very minimal use of personal vehicles at the site.
2. Off-Plant VMT is assumed to be 50 miles/day round trip.
3. Travel days for Phase 1 and 2 is assumed to be daily for the duration of the phase. Travel for Phase 3 is assumed to be weekly for the duration of the phase.
4. Annual travel = Daily vehicles * Total VMT * Travel days/yr.
5. Annual emissions = Emission factor * Annual travel * 1lb/453.6 grams * 1ton/2000lb